

A CHILTON

PUBLICATION

# the IRON AGE

NATIONAL METALWORKING WEEKLY

NTS PAGE 2

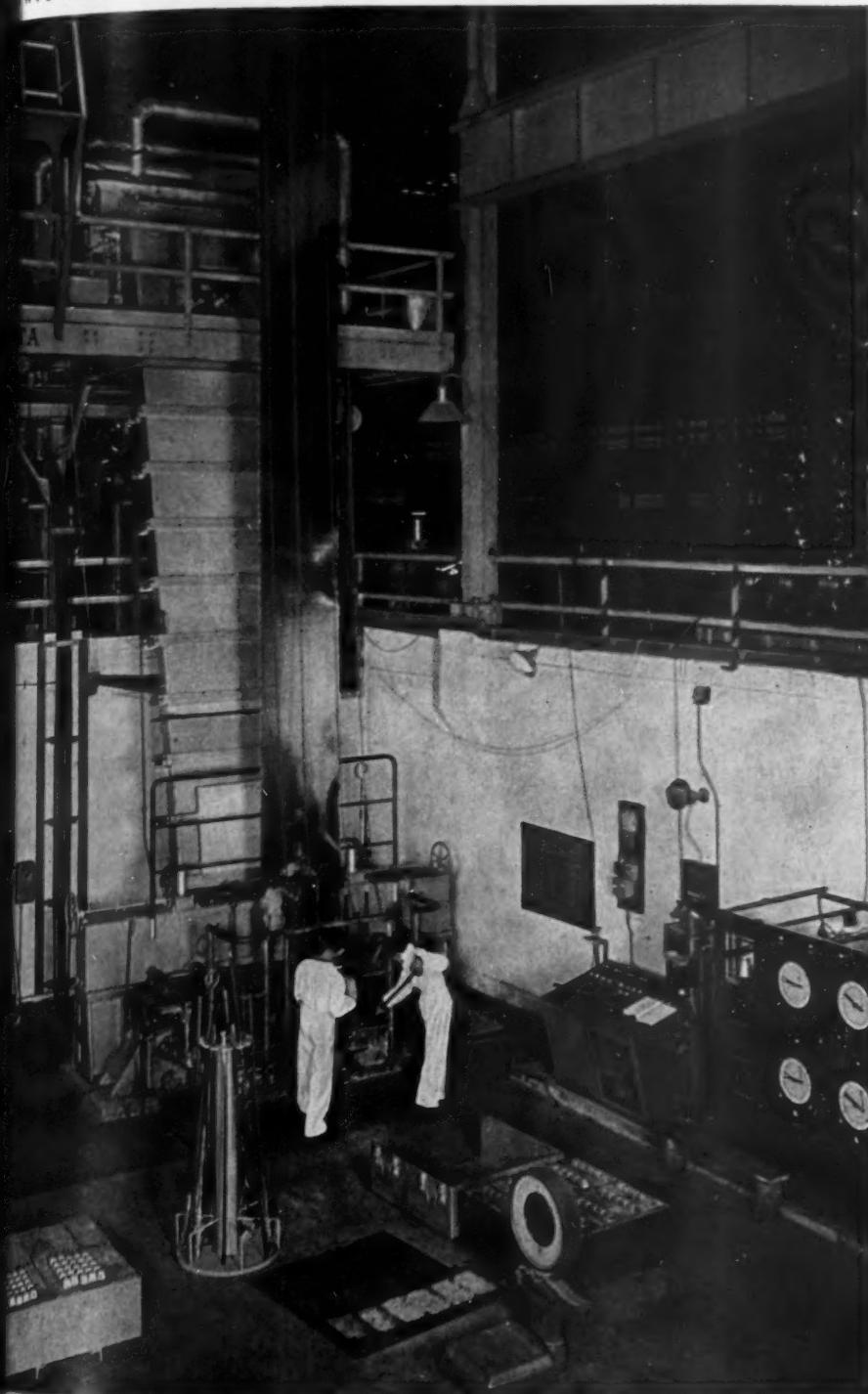
May 20, 1954

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## High-Speed *Continuous* **GALVANIZING LINES**



Steel strip passing through a bath of molten zinc  
on one of the two MESTA 48" CONTINUOUS GALVANIZING LINES

DESIGNERS AND BUILDERS OF COMPLETE STEEL PLANTS

**STA MACHINE COMPANY • PITTSBURGH, PA.**

Designed and Built by  
**MESTA**

for  
**SOUTH AFRICAN  
IRON and STEEL  
INDUSTRIAL  
CORPORATION, LTD.**

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# How many SPARK in a Spark Plug

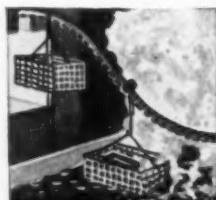


Surprising, the confidence that people have in spark plugs. No one stops to question how many "sparks" they're good for, because long-life performance has come to be taken for granted. Yet, when you get right down to it, you'll find good reasons for this complete consumer confidence. And, from a "sparking" point of view, perhaps the most important is the almost universal use of special Hoskins alloys for the vital electrode wires.

Producing the wire that sparks your car to power is a tough and tricky business. It requires special care in the selection of raw materials. Special melting and production techniques. Plus extremely close control over alloy composition and uniformity of quality throughout the entire manufacturing process.

Yet that's exactly the kind of alloy that Hoskins is qualified to produce best. For, among the other quality-controlled alloys developed and manufac-

tured by Hoskins are: Alloy 717—for facing engine valves; Alloy 785—for brazing belts; Alloy 502—for countless heat resistant mechanical applications. Then, too, there are the Chromel-Alumel thermocouple alloys . . . guaranteed to register true temperature-EMF values within specified close limits. And, of course, Hoskins CHROMEL . . . the original nickel-chromium resistance alloy used as heating elements and cold resistors in countless different products.



Hot stuff for hot jobs!  
Hoskins Alloy 502 is ideally suited to many mechanical-structural applications.



Heating elements made of Hoskins Chromel deliver full-rated power throughout their long and useful life.

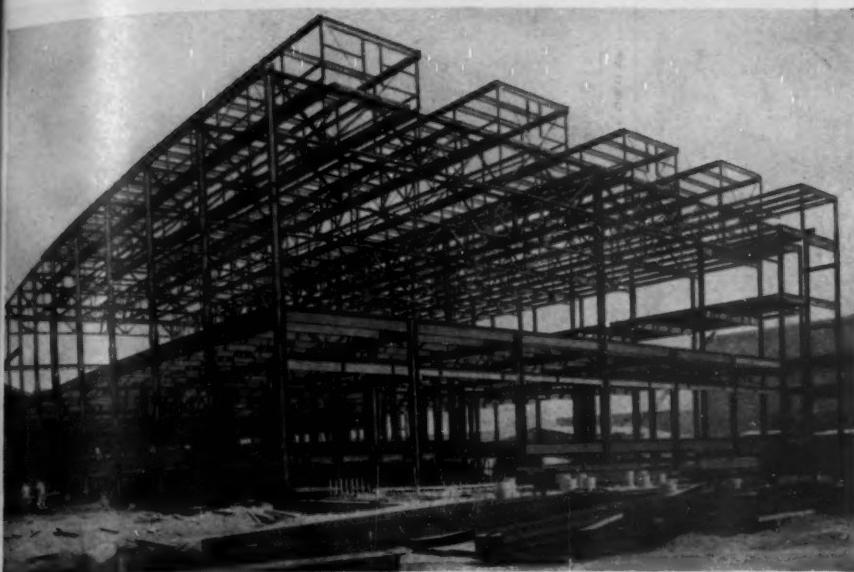


Chromel-Alumel thermocouple alloys accurately measure exhaust temperatures of jet aircraft engines.



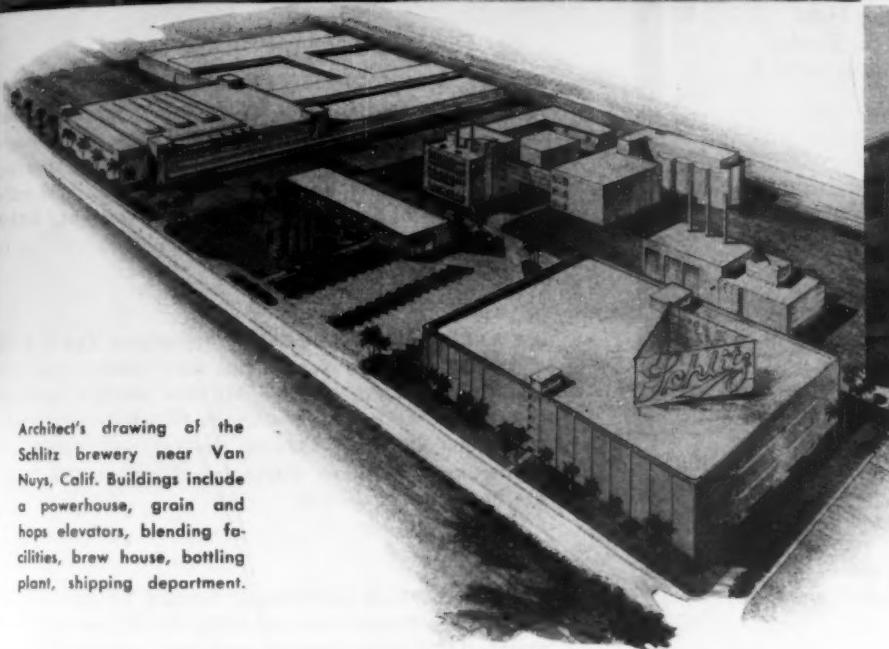
**HOSKINS**  
**MANUFACTURING COMPANY**

4445 LAWTON AVENUE, DETROIT 8, MICHIGAN



Bottling plant of the new Schlitz Brewing Co. brewery as the steel framework neared completion last fall. General Contractor: P. J. Walker Co., Los Angeles. Plans and specifications were prepared by Harley, Ellington and Day, Inc., Detroit. Two Los Angeles firms, Brandow and Johnston and Dames and Moore, were consultants on this project.

Shown almost completed below, the new Schlitz brewery will have an annual capacity of one million barrels.



Architect's drawing of the Schlitz brewery near Van Nuys, Calif. Buildings include a powerhouse, grain and hops elevators, blending facilities, brew house, bottling plant, shipping department.

## \$20 MILLION SCHLITZ BREWERY IN SOUTHERN CALIFORNIA

The beer that made Milwaukee famous is about to be brewed in sunny Southern California. The new unit, first Schlitz brewery on the West Coast, stands on a 35-acre site in the San Fernando Valley near Van Nuys, just north of Hollywood. It will have an annual capacity of one million barrels.

More than 1700 tons of structural steel for the new brewery was fabricated by Bethlehem Pacific at its Los Angeles Works and erected by Bethlehem Pacific's erection division.

In addition, more than 20,000 high-strength bolts, specified instead of field-driven rivets, were used to make permanent structural connections. Making possible quiet, speedy connections, these bolts are made by Bethlehem Pacific at its Los Angeles bolt and nut plant. The Schlitz buildings are probably the first large structures to be erected in this area with bolted connections.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

*Sales Offices:* San Francisco, Los Angeles, Portland, Seattle, Spokane

**BETHLEHEM PACIFIC**



Vol. 173, No. 20, May 20, 1954

\*Starred items are digested at the right.

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THE IRON AGE, published every Thursday by CHILTON CO. (INC.), Chestnut & 56th Sts., Philadelphia 39, Pa. Entered as second class matter, Nov. 8, 1932, at the Post Office at Philadelphia under the act of March 3, 1879, \$5 for 1 year, \$8 for 2 years in United States, its territories and Canada; other Western Hemisphere Countries, \$15, other Foreign Countries, \$25 per year. Single copies, 50¢. Annual Review Issue, \$2.00. Cables: "Ironage," N. Y.

Address mail to 100 E. 42 St., N. Y. 17, N. Y.

## NEWS DEVELOPMENTS

**PERUVIAN IRON ORE DEPOSIT PAYS OFF** — P. 86  
Iron ore shipments from Peru, started last year on a hurry-up basis until Venezuelan shipments hit full stride, are turning into a major windfall for steel mills in the U. S. Mine has good weather, easier digging, better transportation. At least three eastern mills are negotiating for shipments.

**IMPACT EXTRUSION SPEEDS PISTON OUTPUT** — P. 88  
Back extrusion continues to show its versatility—this time in the manufacture of automotive pistons. Thompson Products has applied the method to aluminum alloy pistons in place of conventional permanent-mold casting. Gives higher strength, lighter weight, better fatigue resistance, closer tolerances.

**USE RADIOACTIVE TRACERS IN ALUMINUM LAB** — P. 89  
Metallurgical uses for radioactive tracers are still fairly new—but they're gaining new uses and users at a fantastic rate. Alcoa's studies include lubrication, corrosion, alloy development, metal flow during extrusion, many others. Parts irradiated at Oak Ridge are flown to Pittsburgh.

**DANUBE CARRIES STRATEGIC GOODS TO REDS** — P. 95  
Balkan bootleggers are sneaking U. S. machines and metal down the Danube past the Western control agency. It comes to millions of tons annually. One difficulty is the definition of "strategic." Music wire is strategic—but wire-drawing dies aren't so considered. Fence-sitting Tito holds the stopper.

**NOW'S THE TIME FOR THAT NEW PLANT** — P. 105  
If you're thinking about putting up a new plant, do it now. Building materials are plentiful, prices stabilized, money's easy and there's plenty of competition between contractors. Next year probably won't be so good for construction customers. How to hold an inexpensive press conference.

**KEEP CAR ENGINES CLEAN FOR LONG LIFE** — P. 108  
It sometimes seems that today's automobile engine has a perverse side that insists upon destroying itself. Keeping dirt out is tough enough—but the engine itself creates its own sources of wear and corrosion. Filters, ventilation are weapons in minimizing trouble. Chrysler uses six devices.

# of the Week in Metalworking

## ENGINEERING & PRODUCTION

**PLATING SETUP RECYCLES PROPELLERS** — P. 133  
Several special engineering features built into new installation for zinc plating propeller blades have speeded operations 30 to 50 pct. More important, deposits are consistent. Plating for blade balance, a relatively new use for electroplating, is done by automatic recycling.

**BUILD MACHINE TOOLS AT LOWER COSTS** — P. 136  
Two new machine tool models were recently added to a major line without the usual time out for building and testing prototypes. Months of production time and thousands of dollars were saved. Customer satisfaction proved that the calculated risk paid off when performance matched design theory.

**MOLYBDENUM DISULFIDE EASES PROBLEMS** — P. 138  
Molybdenum disulfide has proved a successful remedy for many difficult lubrication problems. This black mineral lubricant adheres tenaciously to metal surfaces and has proved especially useful in combating galling and seizing of oxidation resistant metals. It is chemically inert and resists most acids.

**SIDE PRESSURE SHOE AIDS STRETCH FORMING** — P. 141  
Stretch forming sheet and extruded lengths to make contoured parts is an accurate, economical method of many tough jobs. Adding a side pressure shoe to the basic rotating die machine permits making accurate arcs and circles from tough alloys. Parts retain their physical properties.

**HEAT TREAT SETUP CUTS HANDLING COSTS** — P. 148  
Automatic, pusher-type, controlled atmosphere gas furnaces simultaneously carburize aircraft gears to varying depths. Three hydraulically operated work rows in each furnace can be set for independent time cycles. Flexible atmosphere control gives correct carbon distribution from case to core.

**NEXT WEEK — MILL ROLLS WIDE MAGNESIUM FLATS**  
Bridging the gap between handmill rolling by Dow Chemical Co. of comparatively small sheets and plates and rolling big magnesium plates and coils up to 84 in. has involved development of rolling mill equipment having unusual flexibility. Multi-million dollar investment backing the future of magnesium.

## MARKETS & PRICES

**ALUMINUM FOIL SALES ROLL UP NEW HIGHS** — P. 85  
This is no recession for aluminum foil salesmen, not when shipments score new records for three consecutive months. Some military uses are off and some civilian markets are taking a bit less. But many new uses are spurring foil on. Packaging is one of the biggest, with a bright label acting as a salesman.

**REPUBLIC TO QUOTE MORE DELIVERED PRICES** — P. 87  
Experience with delivered prices on hot-rolled bars, started last December, has decided Republic Steel to switch cold-finished bars to the same basis. Claim many advantages for both producer and customer. Firm says it will add more in the future. List new mill base prices. Only a limited number of price changes were made.

**FOUNDRIES SLIM DOWN FOR SALES FIGHT** — P. 92  
Foundry industry is plowing through a market shake-down with surprisingly few casualties. Spring surge hasn't started yet, labor costs remain high, and cast scrap has been climbing in some areas. No surprise then, when the foundrymen's meeting stressed cost-cutting and quality control.

**MORE DEFENSE ORDERS WILL BE COMING** — P. 113  
Neither the Administration nor Congress is ready to spring new defense spending plans, but trend of military and diplomatic decisions is a definite tipoff that arms spending here and abroad is to climb in the months ahead. It spells more government business, but it won't hit Korean volume.

**STEEL DEMAND IMPROVEMENT DOESN'T SHOW** — P. 193  
Demand for steel products has actually improved in recent weeks. But the improvement is not reflected in higher production. Reason is that operations which had been supported by order backlogs are now based more closely on new business. Barring labor scare buying production won't increase substantially.

**COPPER DELIVERIES INCREASE IN APRIL** — P. 196  
Domestic copper deliveries to fabricators jumped 9000 tons in April for the highest month so far this year. Production was lower and stocks edged downward. Nichols Wire & Aluminum predicts possibility of a tight aluminum market by year end. Stockpile hearings rescheduled for May 21 in Washington.

# 72 HOLES

Photos courtesy Kirk & Blum, Cincinnati, Ohio

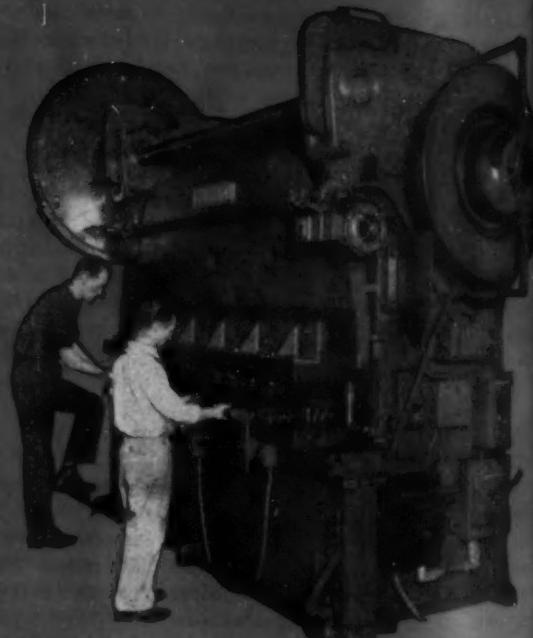
## where they belong

Economical assembly depended on maintaining the accurate spacing of these 72 holes and their accurate positioning on this 10-gauge sheet.

This Cincinnati Press Brake is giving a high production at low cost by its speed and accuracy of performance, which insures rapid low cost assembly.

As a press, they offer high production with low investment. As a Press Brake, their low set-up costs, quick change-overs and versatility bring profits.

Write for Catalog B-4 where many examples of the versatility of Cincinnati Press Brakes are illustrated.



## THE CINCINNATI SHAPER CO.

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THE IRON AGE

Editorial, Advertising and Circulation  
Offices, 100 E. 42nd St., N. Y. 17, N. Y.  
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One of the Publications Owned and  
Published by Chilton Co., Inc., Chestnut  
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Editorial

The Iron Age

FOUNDED 1853

## You Too Are Involved

THE average citizen will be led if the leadership is realistic in attitude and highly moral in purpose. Even our severest critics among our major allies will concede American leadership has a highly moral nonimperialistic purpose. Many Americans agree with those in England and France who claim we are not realistic.

Europeans often mistake diplomacy and negotiation for reality. Many Americans mistake wishful thinking for reality. A few years from now it may be too late to get straightened out. That there has been no basic change—or even the slightest alteration—in the world-domination aims of the Soviet and Chinese Reds is something being overlooked by many.

At home we make believe it isn't true that the Reds really want to or can gain world domination. Or we think it won't happen in our time and that something will come along to prevent it. Many of us are placing our faith in a slogan that we are the stronger. And finally we delude ourselves with that poisonous opiate "everything will be okay."

One can see why an England singularly vulnerable to a quick H-bomb attack and a France susceptible to another inglorious ravaging want to believe something can be attained by talking to the Reds. But it is not logical to believe an enlightened American public—especially including industrial leadership—can escape the dangers in current world affairs and Red maneuvers.

The Soviets and the Red Chinese have all that they have taken by arms and by default. Militarily they are on a par or ahead of the free world today. They are winning in Asia and will take what they want unless prevented. There is no chance of stopping them by catering to them at the conference table. Experience has shown we give but they take—usually amid an allied split engineered by the Soviets.

We need better understanding of what the world thinks of us. More reading of foreign dispatches and more press conferences on foreign affairs by President Eisenhower and his aides will make us more conscious of our dangers. It will also crystallize a cooperative American viewpoint from top to bottom. We need a continuing look at our "new look" in the military. All this is being realistic but its purpose is for a highly moral aim—people undominated by communism.

Tom Campbell

Editor

# Ceilings Unlimited



Galvanite\* strips inserted into tile.



Three principal Galvanite\* parts.



Galvanite\* gripper strip firmly holds

## Removable Tile Snaps into Place on Permanent Galvanite\* Framework

Permits labor-saving, simplified installation.



Here's a great improvement in hanging modern ceiling tile. Standard tile is slotted and metal strips are inserted. The metal strips are tongued to snap into metal gripper bars affixed to the ceiling. The gripper bars, in turn, are held in place by metal hangers. This idea enables faster installation and at any future time any section of tile can be quickly and easily removed to give access above or to replace a damaged tile. The idea has proved its merit. The builders of ultra modern Lever House specified this superior method of ceiling installation.

To make certain of product quality all the tile strips, gripper bars and hangers are made of **Sharon Galvanite\***, the special-process, zinc-coated steel that fights rust and corrosion in so many building products. If your product must withstand the ravages of time why not find out about **Sharon Galvanite\***, one of the most successful rust repellent steels ever developed.

\*Trade name copyrighted by the Sharon Steel Corporation.

Send for  
your copy of  
Sharon's  
New Galvanite\*  
Handbook.

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### SHARON STEEL CORPORATION

*Sharon, Pennsylvania*



# Dear Editor:

Letters from readers

## Ultrasonic Vibrators

Sir:

In the Mar. 25 issue we note a news item on p. 69 worded as follows: "Ultrasonic vibrators have been applied to treatment of molten aluminum. With a high powered generator and transducer unit, gas pockets can be removed from molten aluminum and the grain structure of aluminum ingots refined, engineers have determined."

Since we are interested in the above, we would appreciate your advising the writer the name of the suppliers so we may contact them for further information.

M. R. WARREN  
District Purchasing Agent  
Aluminum Co. of Canada, Ltd.  
Kingston, Ont.

Further details may be obtained from Aeroprojects, Inc., West Chester, Pa.—Ed.

## Mist Lubrication

Sir:

In your Apr. 8 issue we note an interesting write-up on mist lubrication by W. E. Drayton.

We would appreciate being advised the name of the manufacturer and the address for the Alemite Oil-Mist units.

J. L. CLARE  
Supervisor-Methods  
Canadian General Electric Co., Ltd.  
Montreal

For further information contact Ted Grange, Public Relations Dept., Alemite Div., Stewart Warner Corp., 1826 Diversey Parkway, Chicago 14, Ill.—Ed.

## Copper News

Sir:

In the Apr. 8 issue of THE IRON AGE there was an article by Kemp G. Fuller which we would like very much to reproduce in part, at least, in our Copper and Brass News.

We would, therefore, appreciate you giving us permission to use selected parts of this article in a future issue of our News.

G. W. PROFFITT  
Executive Secretary  
Copper & Brass Warehouse Assn.  
Washington

## Basic Lined Cupolas

Sir:

In behalf of J. D. Sheley and myself, I want to thank you for the treatment given to our article "Basic Lined Cupola Cuts Costs, Improves Quality" in your Apr. 29 issue.

We have noticed two errors which may already have been called to your attention. At top of p. 88 this state-

ment appears: "... the average with the above flux is from 20 to 25 pct which is out-of-line for basic practice." It should read "... which is not out of line..."

The last paragraph of the article mentions Table III as listing the four classes of iron melted; the Table III shown on p. 87, however, lists "Analyses of Charged Materials."

T. M. FRAZELL  
Metallurgist

Black-Clawson Co.  
Hamilton, Ohio

## Machining Both Ends

Sir:

The last item in your Newsfront column on p. 71, May 6 issue, makes reference to "machining both ends of a part in the same cycle on a single spindle automatic is now possible with a high degree of economy..."

Can you give me further identifying information regarding this equipment?

D. E. MERRIMAN  
Purchasing Agent

The Stanley Works  
New Britain, Conn.

More details may be obtained from Porter McLeod Machine Tool Co., Inc., 100 Prospect St., Hatfield, Mass.—Ed.

## Intergranular Corrosion

Sir:

The article "Low Carbon Stainless Resists Intergranular Corrosion" which appeared on p. 132 of your May 6 issue is of much interest to us. May we have ten reprints of this article.

C. O. PARROTT

G. O. Carlson, Inc.  
Thorndale, Pa.

## Borides

Sir:

Kindly send three sets of tear sheets of "Borides Designed for High Temperature Use," Apr. 1, 1954, p. 138, and a single set of "Test Determines Presence of High Residual Stresses in Stainless," same issue.

L. P. TARASOV

Norton Co.  
Worcester

## Graphitization

Sir:

I would like to have an extra copy or two of an article which appeared in your issue of Apr. 15 entitled, "How Dissolved Nitrogen Affects Graphitization" by G. V. Smith.

C. F. PASCOE  
Consultant

Canadian Car & Foundry Co., Ltd.  
Montreal



**Which kind of Cold Rolled Strip Steel is best for You ?**

### CONSIDER SHEET COIL

- if variations in physical characteristics are permissible.
- if fairly heavy oversize gauge variations are not objectionable.
- if the fabricating operations are not too complicated and do not require intricate expensive dies.
- if a fine surface finish is not essential.
- if a good base for paint or enamel is desired.
- if you do not object to some "square footage" loss due to oversize variation.
- then Sheet Coil will probably be the most economical material for the job.

### CONSIDER THINSTEEL

- if you must have a high degree of uniformity of chemistry and physical properties—and precision gauge tolerances.
- if you wish to keep die wear low, no oversize gauge variations.
- if you require a fine finish or a better base for plating.
- if you want maximum yield for "most finished parts per ton."
- if you want selected tempers for maximum strength and lightest weight.
- then you'll find Thinsteel the most economical material by far.

**No Argument Here.... Kenilworth Stocks Both**

You can always count on Kenilworth helping you get the right steel for your requirements. Order Sheet Coil or Thinsteel and notice that each coil carries an identifying tag as pictured above. Call on Kenilworth, too, for your needs in Stainless Sheets or flat rolled Spring Steels (Annealed or hardened and tempered).

THE **K**enilworth  
Steel co.

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**BITUMINOUS COALS  
FOR EVERY PURPOSE**



**BALTIMORE & OHIO RAILROAD**

Constantly doing things—better!

**Whatever your fuel needs,  
we have a coal that is**

**Just the Ticket!**

• In fact, you can write *your own ticket*—for the vast Bituminous fields served by the Baltimore & Ohio contain excellent coals *in wide variety*. For centuries to come, these coals will be available—a dependable source of low-cost heat and energy.

Modern mechanization at the mines assures low costs as well as uniform size and quality. The location of the fields—close to industry's front door—contributes to low transportation expense. Storage is economical because costly facilities are not required. And with the help of new combustion methods and equipment, Bituminous offers its users an increased burning potential.

**ASK OUR MAN!** He can give you worthwhile advice as to supply sources and burning methods for the particular coal you need. The efficiency, economy, and cleanliness of B&O Bituminous today will be a revelation!



# Fatigue Cracks

by William M. Coffey

## Congratulations

We hear from Art Rosenbaum of the *San Francisco News* that the top brass in SF turned out several weeks ago to commemorate the 100th anniversary of a brass foundry—M. Greenberg's Sons—which was converted into a dining room for the occasion.

Several *pho passes*, (fr.) were made during the speechmaking, for what reason nobody knows. The general excitement, we guess.

Elmer Ross, Greenberg's sales manager, referred to Lt. Gov. Harold Powers as "Harold Jones." There was a Harold Jones present. The city's purchaser, that is. Later Lt. Gov. Powers himself accepted a glowing introduction from Toastmaster Paul Speegle with a bow, "Thank you, Paul Greenberg," he said.

Art says that after lunch the party went through the foundry inspecting the Greenberg's chief product, hydrants. And not one crack was made about dogs. So congratulations to M. Greenberg's Sons. We'll be joining your 100-year club next year.

## Letters

Dear Mr. Coffey:

I am an old reader, and I do mean old, but would you kindly speak to Mr. Campbell about the seventh paragraph of his excellent editorial in the May 6th issue of your unequalled periodical.

He has split an infinitive.

Ah, me—what are we coming to.

Sincerely yours,

F. H. N. Carter  
Vice President  
Sunrod Manufacturing Co.

\* \* \*

My dear Mr. Carter:

I want to confidentially tell you that I belong to Split Infinitive Anonymous.

Neither my publisher nor my family can do anything with me. On top of that I am forever ending up my sentences with prepositions also.

But I am grateful that you like the paper and the editorial. And many thanks for taking the time to write to us.

Sincerely yours,  
Tom Campbell

## Perms

The most distinguished list of people in the World is our own IRON AGE subscription list. Matter of fact we consciously restrict it to metalworking engineers, production men and executives. And sometimes, poets.

I'll be dropped from the mailin' list—Y'say?

Well I reckon it just caint be any other way.

How I got there in the first place—Is a mystery to me, But I'm very, very sorry  
That THE IRON AGE ain't free.

Frum the various groups you've mentioned,

I'm a right fur piece away—Even tho—

I've spent some thirty-odd years fer U. S. Steel

I've never seen the day when I wuz rated

An executive, an engineer 'er production man,

Yet I still enjoy good readin'  
And i git it when I can.

A friend uv' mine gets *Business Week* an'

*U. S. News and World Report*—  
which he

Gives to me when he gits done—So I'm never really short—uv' current Events an' goings on—that happen here—

An' there—But if I just had yer IRON AGE

I'd feel I had my share.

And if I only had that Five Spot I'd sign up cheerfully

But thanks, anyhow, fer yer letter An' I hope thur'll come a day—When cash is a little more plentiful An' prosperity here t' stay.

The writer of this cantanometer (poem talk) is as distinguished as anyone we know—and the perm is worth a five spot in any language!

... and our Aptronym Editor in Nova Scotia, Mr. D. A. Redmond of the Nova Scotia Technical College tells us of a Dr. Norman Foote who is executive secretary of the Canadian Assn. of Chiropractors. Mr. Redmond also mentions the Halifax firm of E. M. Tanner & Son, leather merchants.

## Puzzlers

The sides and height of a triangle are four consecutive integers. What is the area of the triangle?

now you can  
produce  
trouble-free,

FREE-  
MACHINING  
STEEL  
with  
**FOOTE  
MANGANESE  
SULPHIDE**

This fume-free ladle additive increases quality and reduces the cost of producing high sulphur, free-machining steels . . . with these plus advantages:

1. **improved hot rolling behavior**
2. **fewer surface defects**
3. **fewer diversions**
4. **lower conditioning costs**
5. **low carbon content saves heat time**

### TYPICAL ANALYSIS

Manganese	53%
Sulphur	32%
Carbon	.22%

Size: 1" x 5" lump

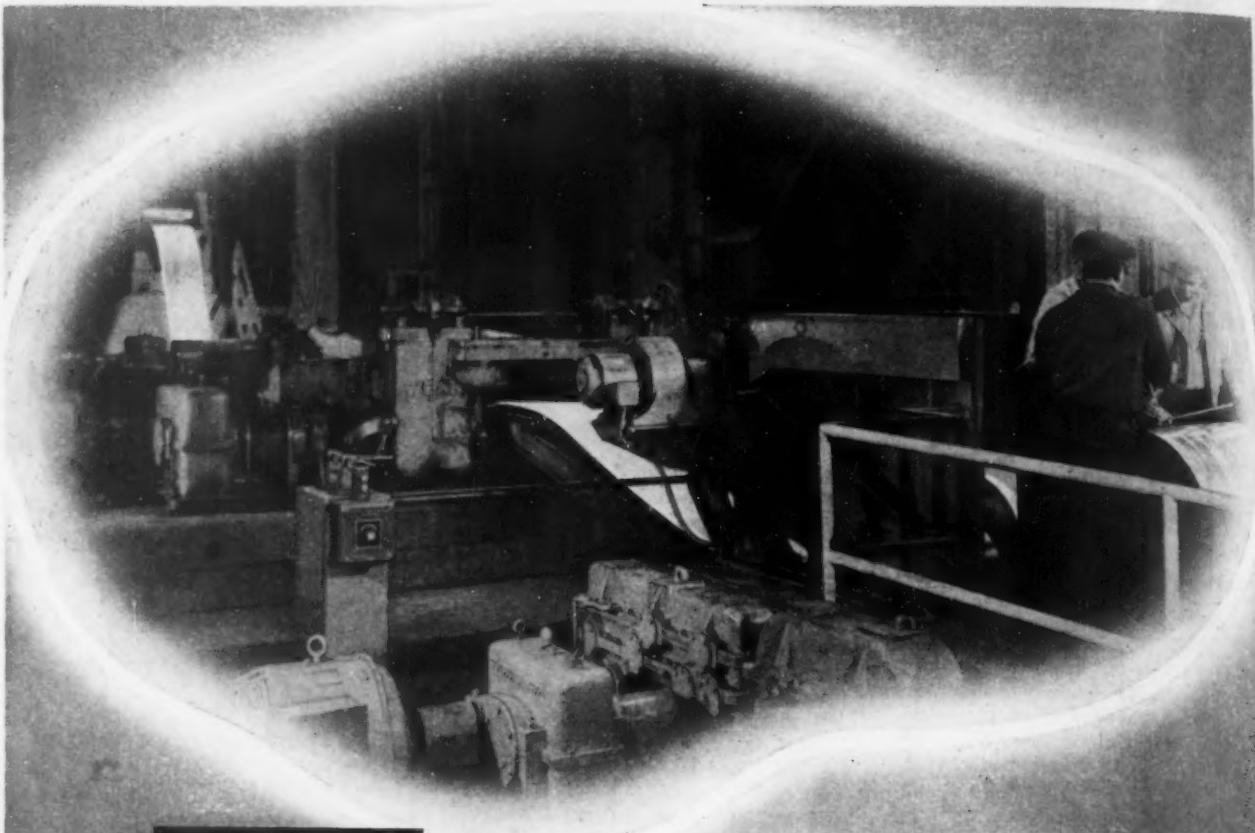
write for further details!

**Foote**  
MINERAL COMPANY

438 Eighteen W. Chelten Bldg.  
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# ALAN WOOD CONTINUOUS MILL

PLATE • SHEET • STRIP—available in hot rolled quality



More than  
a century and  
a quarter of  
iron and  
steel making  
experience

This new pickle line is a good example of the modern equipment used by Alan Wood in producing the highest possible steel quality.

Precision equipment such as this, and our policy of mine-to-mill undivided responsibility are your guarantee of always getting exactly what you want. The Alan Wood Continuous Mill produces steel from .059" to .500" to a maximum width 25½ inches, and is available in coils or cut lengths.

Our Eastern location, close to transportation, also means faster delivery . . . and often lower freight rates.

**ALAN WOOD STEEL COMPANY**

CONSHOHOCKEN, PA.

## Dates to Remember

### Meetings

#### MAY

ELECTRIC TOOL INSTITUTE—Spring meeting, May 23-25, The Greenbrier, White Sulphur Springs, W. Va. Institute headquarters are at Clark Bldg., Pittsburgh.

COPPER & BRASS RESEARCH ASSN.—Annual meeting, May 23-26, The Homestead, Hot Springs, Va. Association headquarters are at 420 Lexington Ave., New York.

NATIONAL ASSN. OF PURCHASING AGENTS—Annual meeting, May 23-26, Conrad Hilton Hotel, Chicago. Association headquarters are at 11 Park Place, New York.

#### EXPOSITIONS

AMERICAN SOCIETY FOR METALS—National Metal Exposition, national metal congress, Nov. 1-5, Palmer House, Chicago. Society headquarters are at 7301 Euclid Ave., Cleveland.

STEEL BOILER INSTITUTE, INC.—Annual meeting, May 24-25, Atlantic City, N. J. Institute headquarters are at 1308 Land Title Bldg., Broad & Chestnut Sts., Philadelphia.

AMERICAN GAS ASSN.—Production and Chemical conference, May 24-26, William Penn Hotel, Pittsburgh. Association headquarters are at 420 Lexington Ave., New York.

INDUSTRIAL DIAMOND ASSN. OF AMERICA, INC.—Annual meeting and convention, May 25-28, Claridge Hotel, Atlantic City, N. J. Association headquarters are at 124 E. 40th St., New York.

AMERICAN IRON & STEEL INSTITUTE—General meeting, May 26-27, Waldorf-Astoria Hotel, New York. Institute headquarters are at 350 Fifth Ave., New York.

STEEL KITCHEN CABINET MANUFACTURERS ASSN.—May 27-29, White Sulphur Springs, W. Va. Association headquarters are at 1008 Engineers Bldg., Cleveland.

#### JUNE

AUTOMOBILE MANUFACTURERS ASSN.—Annual meeting, June, Detroit. Association headquarters are at 320 New Center Bldg., Detroit.

EDISON ELECTRIC INSTITUTE—Annual meeting, June 1-4. Institute headquarters are at 420 Lexington Ave., New York.

AMERICAN GEAR MANUFACTURERS ASSN.—Annual meeting, June 6-9. The Homestead, Hot Springs, Va. Association headquarters are at Empire Bldg., Pittsburgh.

NATIONAL METAL TRADES ASSN.—Annual Western plant management conference, June 6-12. Association headquarters are at 122 S. Michigan Ave., Chicago.

SOCIETY OF AUTOMOTIVE ENGINEERS—Summer meeting, June 6-11. The Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J. Society headquarters are at 29 W. 39th St., New York.

AMERICAN FOUNDRYMEN'S SOCIETY—Annual meeting, June 7, Chicago. Society headquarters are at 616 S. Michigan Ave., Chicago.

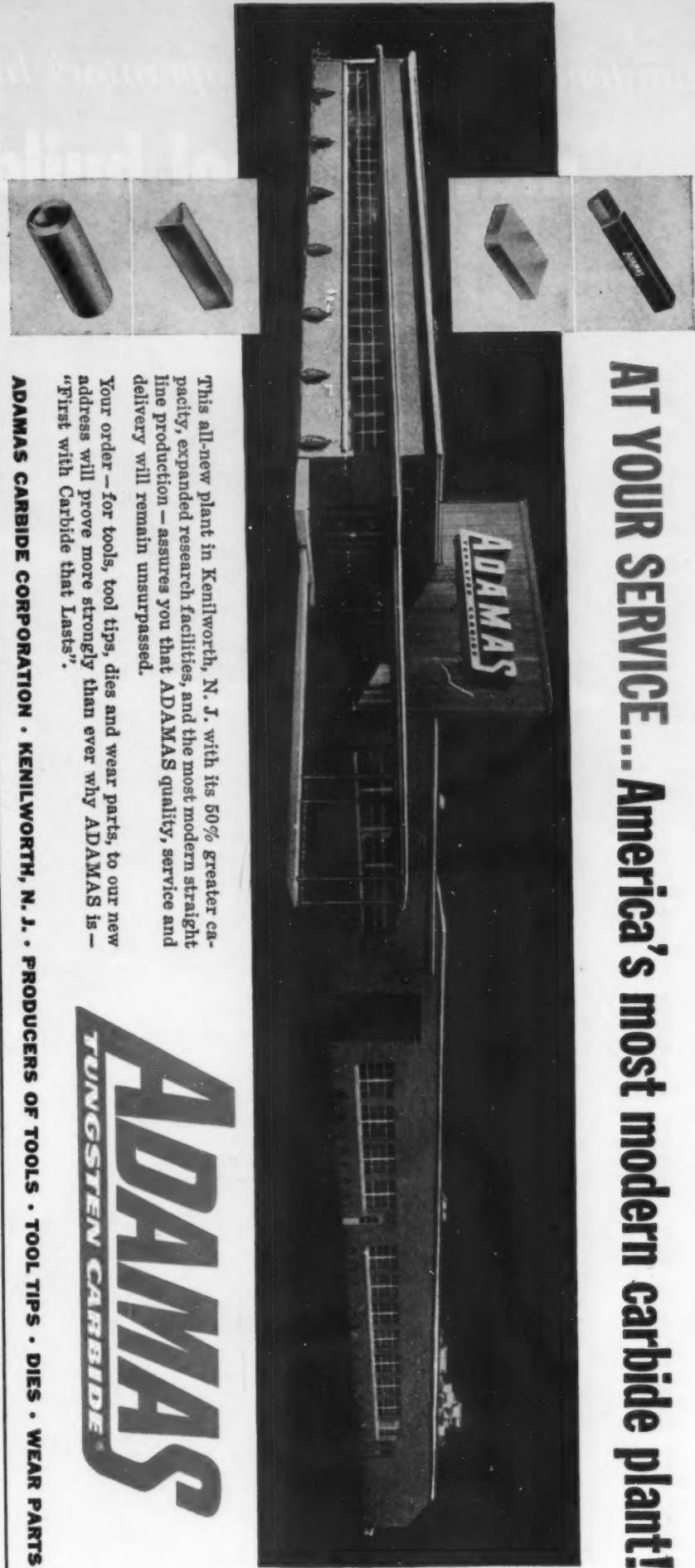
THE INSTITUTE OF COOKING & HEATING APPLIANCE MANUFACTURERS—Annual meeting, June 7-9, Netherland Plaza Hotel, Cincinnati. Institute headquarters are at The Shoreham Hotel, Washington, D. C.

AMERICAN SOCIETY FOR QUALITY CONTROL—Annual convention, June 9-11, Jefferson Hotel, St. Louis, Mo. Society headquarters are at Room 5036, 70 E. 42nd St., New York.

CUTTING TOOL MANUFACTURERS ASSN.—Summer meeting, June 11. Association headquarters are at 416 Penobscot Bldg., Detroit.

MAGNESIUM ASSN.—Summer meeting, June 9-12, Seigniorly Club, Quebec. Association headquarters are at 122 E. 42nd St., New York.

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*"Maintenance costs small, operators like LeBlonds..."*

# machine tool builder Greaves



Lineup of LeBlond Lathes at Greaves:

17" Rapid Production (foreground), seven 17" Regals and a 15" Regal. Turn precision parts for milling machines on 24-hour schedule. Dependable, versatile, accurate, cost little to maintain.

# THE IRON AGE Newsfront

AN INFRA-RED TV TUBE recently developed could sharply change plant protection methods. New closed circuit setup will be a natural for night time parking lot surveillance, routine gate checks now handled by plant guards.

NEWLY FORMED AMERICAN MOTORS CORP. may well be the start toward formation of a fourth major auto producer. Nash-Hudson consolidation talks started six years ago. Look for: (1) Moves toward completely integrated operations before new overtures toward other automakers. (2) Efforts to find a supply source for V-8 engines.

A NEW DEMAND BY INDUSTRY FOR METALLURGISTS was evident in recruiting of technical graduates this year. Placement experts attribute rise to sharpened interest of foundrymen in many new technological improvements.

LOWER COSTS IN RECLAMATION OF FOUNDRY SANDS are reported possible with a new wet process. Processing includes washing, filtering, blowing and classifying. Reclamation costs for one installation averaged \$1.74 per ton.

ELECTROLYTIC SHEET IRON being produced in Japan yields an exceptionally pure iron for electrolytic applications, it is reported. Process by-product--fragments broken from the cathode sheet during handling--form the raw material for an electrolytic iron powder.

STRONGER, SHATTERPROOF PLASTIC CANOPIES for military planes may be on the way. Navy experiments have shown marked gains in strength are made when hot sheets of plastic are stretched or pressed. A bullet will penetrate but not shatter the material.

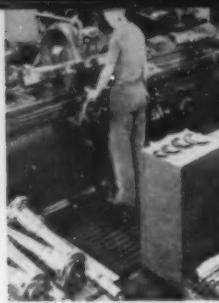
SAVINGS OF UP TO 50 PCT OF RESIN CONTENT is claimed for two new processes of coating shell molding sands. One uses cold liquid resin; the other is a hot process. Better casting quality is reported due to more uniform coating of sand.

CONSERVATION OF WATER SUPPLY, a problem affecting many plating operations, received special attention in a recent aircraft plating installation. All spray-rinse tanks are equipped with electric eyes. Spraying occurs only when parts break the beam.

A NEW WELDING PROCESS uses a flux-cored electrode to shield the weld puddle and a separate gas to shield the arc column. High current densities permit complete one-pass penetration and high welding speeds on all common steels, including rimmed steel.

RADIOISOTOPES WILL BE ADDED to the hydraulic fluid as an additional test of the new Transatlantic cable now being manufactured. Both cable and repeater stations will get this check in special 10,000 psi hydrostatic testing equipment now being built.

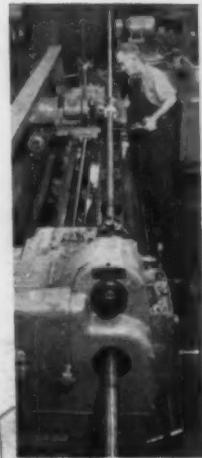
A TWO-STAGE FURNACE recently developed in England heats steel to 2300° F without scale formation in a gas and oxygen atmosphere. Units are being successfully used to heat slugs for breech block forgings and with the Sejournet process, the British report.



Massive, rigid spindle  
is precision balanced  
before installation  
and final grinding of  
register, face and bore.

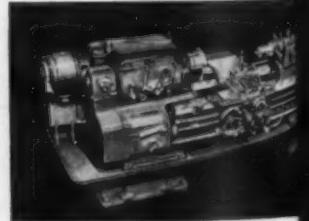


Planing of the bedway and final  
precision grinding of tool  
steel vee and flat ways are vital  
operations in the final  
accuracy of the finished lathe.



Thread milling  
stress relieved  
alloy steel lead  
screw in a temper-  
ature-humidity  
controlled room.

20" Model D heavy duty, 24 spm  
precision engine lathe



Axelson lathe quality control, which starts in Axelson's own foundry, follows a rigid pattern throughout each step in production and assembly. Never is it more apparent than during the machining stage. Here, skilled Axelson craftsmen use the most modern machine tools to provide that extra measure of accuracy and dependability so well known to users of Axelson lathes... Get the facts about one of Industry's finest precision tools. Write on your letterhead for NEW, 36 page brochure No. 5400.

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# ALUMINUM: Foil Sales Roll Up New Highs

**Shipments of aluminum foil in 1954 set monthly, quarterly records . . . New applications spur market . . . Packaging is major field . . . Laminates gain ground—By R. L. Hatschek.**

Aluminum foil salesmen prefer to call the current period a "readjustment" rather than a "recession." They have good reason—their adjustment is upward. Industry shipments of aluminum foil, as reported by the Aluminum Assn., set three consecutive monthly records in January, February and March. First quarter total shipments of 16,678 tons—and there's a lot of foil in a ton—were 13 pct over the preceding quarter. And that period had also established a record.

#### Find New Uses

Going back a bit further, 1950 monthly shipments averaged 3778 tons. This rose to the 1951 average of 3927 tons monthly, but the severe aluminum shortage took its toll late in '51 and '52. Monthly average in the latter year was only 3242 tons. With better availability of aluminum in 1953, foil shipments snapped back to average 3722 tons monthly. First quarter 1954 average was 5559 tons.

Have housewives been using that much kitchen foil? No—although household foil is still very strong. It hasn't slumped nearly so much as other aluminum products. Real answer lies in new applications.

Packaging uses grow steadily. Foil gives good protection, also provides a bright, eye-catching display. And trend to self-service supermarkets means growing importance of this feature.

One brewery learned through experience the value of bright foil labels. Sales dropped when Korea forced a switch to paper labels, rose when bottles could again sport aluminum.

Reynolds Metals Co. supplies users with small tags saying that the products are protected by Reynolds Wrap. Idea is that the housewife is already familiar with Reynolds Wrap, will be more likely to shell out for such a well-protected product.

And Reynolds will be getting a nice boost this year—the firm estimates 2 billion packages will carry their tags to the customer.

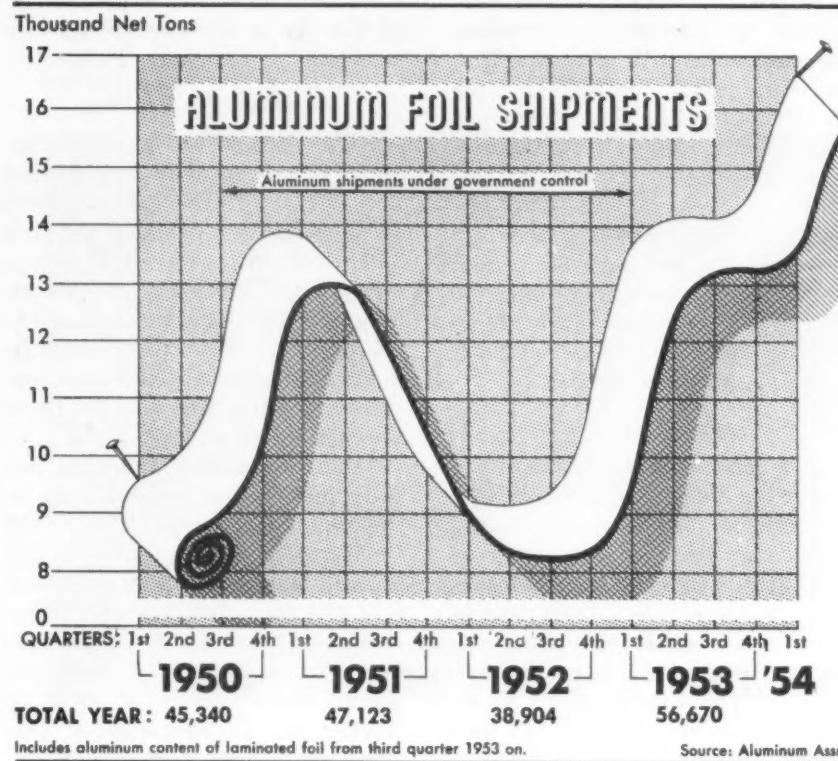
Another recent foil use is an aluminum-lined cardboard carton for citrus fruits. Quantity in use so far is only slight but is certain to grow.

A good bit of the packaging boost has been in laminated foil.

Here the advantages of aluminum are wedded to those of other materials such as paper and plastics. Typical of these is a sandwich consisting of 0.001-in. cellulose acetate, 0.001-in. aluminum foil, and a vinyl heat seal.

High-strength laminates, usually including a layer of cheesecloth, are made for military packaging. Sales to the military, however, are off. But other military uses of foil, electronic and radar applications for instance, are holding up.

Other factors helping the foil boom include a booming electronics industry which uses aluminum foil in condensers; growing use for decorative purposes such as florist's foil; and high level of construction together with a substantial pickup in the use of foil as reflective insulation.





LOADING ore with a traveling gantry crane that fills ships at rate of 1000 tons per hour. Set-up is flexible, avoids moving of ships.

"The mine is located in an area which has perfect weather for operations. Rain is virtually unknown and all phases of the activity can be conducted through the year without bad weather interference. This factor is of real assistance in guaranteeing deliveries and programming operations."

#### Built in 100 Days

Total investment in the deposit so far is about \$13.5 million including \$1 million borrowed under a \$2.5 million credit granted last year by Export-Import Bank. Marcona's original 21-year option has also been extended to cover a period of 30 years.

Extreme urgency in starting the San Juan ore operation set something of a record. First ore shipment went out only 100 days after the arrival of equipment hastily assembled from the western U. S. and unloaded on the beach (*THE IRON AGE*, Aug. 13, 1953, p. 85).

Recent major installation has been a 66 x 84 in. jaw crusher. This \$250,000 unit, built on special order by Birdsboro-Buchanan of Pittsburgh, takes mine run ore directly from 34-ton Euclid trucks which load at five neighboring pits. Light overburden is easily removed by scrapers so shovels can be used full time on loading the trucks.

#### Trucks Move Ore

From the primary crusher the ore is carried 18 miles to the coast by a fleet of 17 high speed bottom-dump tractor trailers and stockpiled for conveyor belt loading on ships. Three shipping firms use Liberty ships to take ore to Fairless Works and Mobile. Trip takes 2-3 weeks depending on speed and destination.

Ore which ranges from 4 in. maximum to 10 pct through a 3 in. screen is mixed with the finer sized Venezuelan and Lakes ores for a Pan-American blend.

## ORE: Peruvian Deposit Pays Off

**U. S.-operated, \$13.5 million stop-gap project at San Juan a windfall . . . Has good weather, easier digging, transport . . . May undercut Venezuelan ore—By T. M. Rohan.**

Iron ore shipments from Peru, started last year on a hurry-up basis until Venezuelan shipments hit full stride, are turning into a major windfall for steel mills in the U. S.

At least three eastern steel producers are currently negotiating for shipments with Marcona Mining Co., jointly owned by Utah Construction Co., San Francisco, and Cyprus Mines Corp., international mining firm. Over 200,000 tons of the 60 pct hematite-type ore are being delivered monthly from the deposit near San Juan, Peru, 300 miles south of Lima, to U. S. Steel's Fairless Works, Morrisville, Pa., and Tennessee Coal & Iron Div. at Birmingham.

#### Supply U. S., Peru

It is believed that in spite of the \$1-per-ton Panama Canal toll, cost of Peruvian ore delivered in the states may be lower than that of U. S. Steel's Orinoco mine in Venezuela because of a shorter haul to tidewater. Peru deposit is only 18 miles from tidewater compared with a 100-mile river haul in Venezuela where vessels must sail half loaded until channel is deepened.

It is not inconceivable that the San Juan ore, with proved reserves of 100 million tons, could some day be used to supply additional U. S. West Coast blast furnaces. Arrangements have already been made to supply a percentage of the ore to an electric smelter steel mill at Chimbote, Peru.

#### Weather No Problem

At present 80 pct of the equipment has been delivered to the mill site at Chimbote, but project is now delayed pending funding of further hydro-electric development. When completed the Chimbote mill will have an annual capacity of 55,000 tons, mostly in merchant sections, sheets and reinforcing bars. Mill will not be in production for at least 3 years.

"Total investment and yield has fully justified our expectations in the San Juan deposit," Allen D. Christensen, Utah Construction Co. and Marcona Mining president told *THE IRON AGE* last week. "Operations at the mine have now settled down on an efficient basis and the problems that are inherent in starting up an operation of this size seem to have been solved.

# STEEL: Switched to Delivered Price

**Republic Steel will quote cold-finished bars on delivered basis  
... Experience with delivered prices on hot-rolled bars  
proved value ... Will add other products later.**

Delivered pricing method applied by Republic Steel Corp. to hot-rolled carbon bars last Dec. 15 is now being extended to cold-finished bars, the company said today. Effective date will be May 24. And Republic spokesmen say the pricing procedure will be extended to other products soon.

When the plan was instituted last year Republic stated it would extend the method to other products if anticipated advantages materialized. In its experience with hot-rolled carbon bars, Republic has found:

1. Customer's ability to compare his delivered price by various means of transportation has proved to be a real aid.
2. Ability of Republic salesmen to quote delivered prices quickly has proved to be an advantage.
3. There are substantial savings in time and cost in the sales, traffic and accounting departments.

### New Mill Prices

Republic has established new mill base prices for cold-finished bars: Beaver Falls, Pa., \$5.26 per 100 lb; Gary, \$5.27; Hartford, Conn., \$5.70; and Massillon, Ohio, \$5.24. Firm also produces cold-finished bars at Los Angeles.

Republic will deliver to any railroad destination within the counties covered by the switching area immediately adjacent to each of the above producing points in 80,000-lb minimum carloads at these base prices.

Delivered prices have likewise been established from each of Republic's cold-finished bar mills for all counties—except the West Coast area—into which shipment is customarily made.

Because of transportation problems peculiar to the West Coast area, two mill base prices have been established at the Los Angeles plant, \$6.65 or \$6.96 per 100

lb dependent on size or grade. A delivered pricing method has also been established for the West Coast that takes into consideration such peculiar transportation problems.

At all producing points the customer is given a choice of all feasible methods of transportation. For example, in many counties, prices will be shown for 80,000-lb rail delivery, 40,000-lb rail delivery, 32,000-lb truck delivery and 20,000-lb truck delivery. In areas where different minimum weights are applicable this factor has been taken into consideration.

Price lists have been published covering all such conditions and are being distributed to Republic's cold-finished bar customers. As a result, delivered base price will be instantly available without the necessity of computing transportation charges. Customer can also determine from published information exactly what products, size ranges, and so on, are produced at each of Republic's cold-finished bar mills and which mill has the

lowest delivered prices to his plant. Under the plan, the customer is relieved of the bookkeeping requirements involved in handling transportation charges. He will have no freight damage claims to prosecute and no transportation to arrange.

In announcing the change in pricing procedure, Norman W. Foy, vice-president in charge of sales, said that the delivered cost to cold-finished bar customers would be substantially the same. In some cases, there may be slight reductions and in others slight increases, but nothing big.

### System Praised

"Republic receives certain advantages from the delivered price method," Mr. Foy said, "but there are also advantages accruing to our customers."

"Since last December when we adopted this plan for hot-rolled carbon bars, we have received many letters and telephone calls from our customers, particularly the smaller customers. Their comments were not only favorable, but in many cases enthusiastic.

"We have been greatly pleased by this response and we believe that the ultimate extension of the delivered pricing method to most of our steel products will be a great forward step."



**FOUR-WAY GRAB** is a recently installed innovation at Hotpoint Co.'s new refrigerator plant. Device is said to cut handling time by 70 pct.

## EXTRUSION: Speeds Piston Output

**Aluminum alloy pistons produced faster by back extrusion at Thompson Products . . . Up strength 50 pct, cut weight 30 pct . . . Extend fatigue life 100 pct . . . Report close tolerances.**

Back extrusion continues to show its versatility—this time in the manufacture of automotive pistons. Thompson Products, Inc., Cleveland, has applied the method to aluminum alloy pistons, believes it has come up with a way to produce them cheaper, faster and of better quality.

Produced by impact extrusion instead of the more usual permanent mold casting, the pistons are claimed to be up to 50 pct stronger and 30 pct lighter. Heat treating is given to increase tensile strength and improve ductility. Fatigue life is said to be 100 pct higher. Closer tolerances are also claimed.

### Output Rate Higher

Thompson Products' Light Metals Div. is credited with the development. Since the division handles nearly 1100 different types, sizes and models of pistons ranging from 2.2 to 6 in. in diameter, you can understand the interest in better production methods.

Standard production method for virtually all the 40 or 50 million aluminum pistons made yearly is permanent mold casting. After removal from the iron mold, gates and risers are trimmed off and pistons are heat treated, then finish machined. Production rate of castings per man-hour is about 100 to 200.

Man-hour production rate with extrusion is claimed to be 500 to 600. Process also lends itself well to automatic operation which would further boost the production rate.

### How It Works

Individual operations are:

- (1) Cut slugs from bar stock with saw or abrasive wheel.
- (2) Heat slugs in rotary hearth furnace or by induction.

(3) Preheat extrusion die in press with gas torch.

(4) Place hot slugs in die. Extrude in crank-type hydraulic press. Lubricate between extrusions with graphite grease compound.

(5) Remove flash with trim die.

(6) Heat treat in gas-fired or electric circulating air furnaces to develop desired physical properties.

(7) Finish machine in usual manner.

### Lighter and Thinner

With Detroit still in a horsepower race, both lighter weight and higher strength are important. Lighter weight reduces inertia of reciprocating parts, stepping up the engine's output. And higher speed demands stronger pistons. Claimed better physicals of the extruded piston permit thinner sections for lighter weight while retaining desired strength.

One design, almost 2 oz lighter than its permanent mold counterpart, was reported to show no

fatigue failure after 40 million cycles under the same test conditions that produced failure in the cast piston at 10 million cycles. Both design changes and better metallic structure contributed.

While there are problems in setting up any new process, Thompson Products foresees a healthy future for the extrusion method because of its many advantages. Biggest selling point in today's competitive markets is the lower production cost claimed.

## Atom:

**Nuclear fuel would cut electric rates, Congress told.**

Use of atomic power in producing electricity would drop domestic electric rates only 12 pct, the Senate-House committee on atomic energy has been told.

Newton I. Steers, Jr., president of Atomic Development Mutual Fund, Inc., told the committee that reduced costs of obtaining and transporting atomic fuel would be offset by higher capitalization needed to use it.

### Atomic Investment Common

He said the impression that many people have that atomic power and the arrival of the millennium are the same thing is not the case in this country, although it may be so in countries where electric power is not so cheap.

Investing in atomic energy is now commonplace, Mr. Steers said. Seven groups, comprising about 50 companies including most of the large electric utilities, are already studying atomic power and private investments have built up an atomic industry grossing \$459 million a year.

Mr. Steers, head of an investment firm dealing in shares of companies in various phases of atomic work, said there is a "reasonable chance" that atomic investments will fare better than average, but warned there is no justification for special emphasis by the individual investor at this time.



FREE ride for British atomic workers is to prevent danger of shaking off radioactive dust in walking.

# ATOMS: Use Tracers for Aluminum

Alcoa puts radioactivity to work . . . Uses "tagged" ingot to check metal flow in extrusion . . . Corrosion, lubricants, alloys, other studies made.

Putting atoms to work on metallurgical problems is a relatively recent development—but these war-born techniques are gaining new uses and new users at a fantastic rate.

Among uses for radioactive tracers reported by Aluminum Co. of America are research studies on lubrication evaluation, corrosion resistance, analytical chemistry, alloy development, and metal flow during extrusion.

## Measure Metal Corrosion

Lubricant research is one example of how radioactivity is used at Alcoa's New Kensington, Pa., laboratories. A bearing, made radioactive in a neutron pile at Oak Ridge National Laboratory, is placed in a normal working situation at New Kensington.

Measuring radioactivity of the oil after the run indicates how much metal has been worn off. Simple, yet results can be obtained in the microinch range—impossible by any other method.

Corrosion is checked by immersing a metal sample in a corrosive solution containing a trace of radioactive material. As little as 5 parts per 100,000,000 may be enough. A Geiger counter checkup after short exposure gives accurate measure of how much corrosive material has been picked up.

## Check Extrusion Flow

Corrosion areas may also be photographed merely by placing the metal sample on special radiation-sensitive film.

One technique that may lead to improved die design and better, cheaper production methods—for other metals as well as aluminum—is study of metal flow during extrusion. Extrusion is limited by slow speeds on hard aluminum alloys and the difficulty of getting a smooth surface finish on softer alloys.

Detailed characteristics of the metal flow are determined by inserting small slugs of radioactive aluminum alloy into holes drilled in the extrusion ingot. After extrusion, the flow line is marked for the Geiger counter by a thread of radioactive metal. This may be precisely located by placing a section of the extrusion on a piece of film as in the corrosion studies.

## Schedule Use Carefully

By correlating this flow data with temperature, force distribution, and other basic conditions prevailing during extrusion engineers can improve on the process.

Alcoa's tracer program was in-



SHIELDED lathe is used in tool wear tests. Wear of radioactive cutter can be measured after only two revolutions of the lathe.



RADIOACTIVE PLUG is inserted into extrusion ingot of same alloy. Metal flow during extrusion will later be traced by radioactive thread.

## Research

initiated by Dr. L. M. Foster, who worked on the Manhattan project at the University of Chicago and Los Alamos. Dr. R. C. Plumb, with experience at Oak Ridge and special work on autoradiography, is in charge of the tracer laboratory.

### What to Do With Waste

One of the frequent problems faced by isotopes users is that many of the activated materials lose their radioactivity rapidly. Others are of such durability that they may be stored and used as necessary. Alcoa solves the short life problem by having samples flown from Oak Ridge and picking them up at the Pittsburgh airport. They're used immediately in a carefully worked-out schedule at the laboratory.

Problem of radioactive waste products is handled by returning the "hot" waste to Oak Ridge for disposal. This eliminates the possibility of radioactive contamination of Alcoa's commercial products.

## Titanium:

New titanium alloy said to be stronger, less brittle.

New titanium alloys with tensile strength up to 192,000 psi are reported to have been developed by Watertown Arsenal Laboratory, Watertown, Mass., Army titanium research center.

In addition to claiming that its new alloy is stronger (by 42,000 psi) than other commercial titanium alloys now being produced, the Watertown Arsenal says it is more ductile and overcomes the brittleness that has limited use of other titanium alloys.

### Use as Armor

Though additional tests must still be made, the new alloy is regarded as a potential substitute for steel in many ordnance components and may find use in heavy weapons, tanks and as armor plate.

Like other titanium alloys, it is about 40 pct lighter than steel, and is highly corrosion-resistant.

# ...How about Malleable?

## Reduce Machining Time and Cost Increase Product Durability

Malleable iron machines easier than any other ferrous metal of comparable strength and toughness. It can be cast into intricate shapes close to final form, greatly reducing machining. Malleable often can be further formed by press or coining operations and holes punched instead of drilled.

Take advantage of malleable's machinability, ductility, resistance to shock and corrosion when designing new products or looking for ways to cut costs on current production. Call a malleable foundry and go over your products with their engineers. Find out how malleable can improve your products and save money.



### Automotive Differential Case

Because of malleable's remarkable machinability the 7 $\frac{1}{8}$ " flange on this casting is turned at a rate of more than 125 parts per hour. Carbide tools are used with water as a coolant. Tool life averages 18 to 20 hours per grind.

Send for "Malleable Iron Facts" useful information on Malleable iron properties and uses.

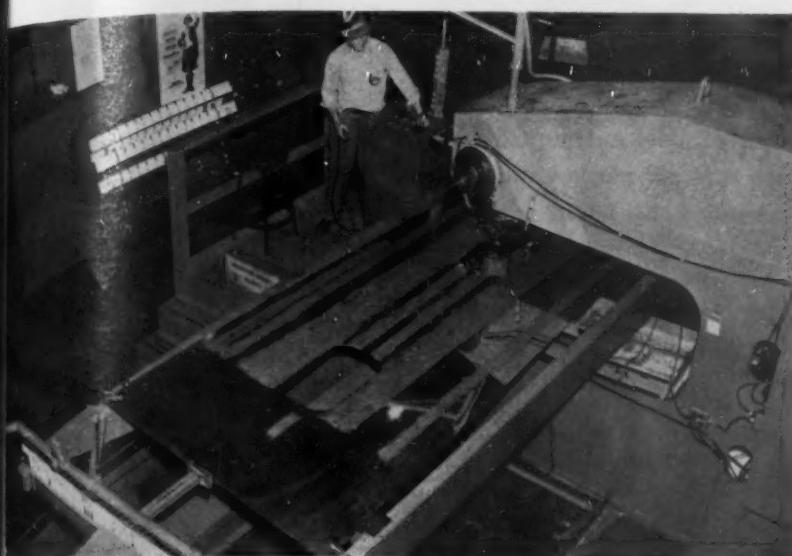
Just write to . . .

**Malleable**  
**FOUNDERS' SOCIETY**



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READY to turn on power as . . .

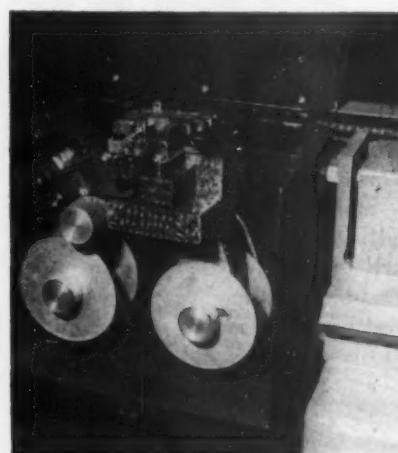
## Convair Rivets Planes By Film

Maybe it's the Hollywood influence—whatever it is they're using 35 mm motion picture film to rivet aircraft at Convair's San Diego plant. And Convair says its new film-controlled Drivmatic riveting machine has cut production time, can do five times as many automatic operations as the photoelectric indexing systems formerly used.

The machine also drills, countersinks, selects the proper rivet, inserts and sets it, all from one starting signal.

Heart of the machine is a five-channel film-index control system. Ordinary 35 mm film is perforated by the indexing device on the first setup. Mechanical feelers find the punched holes in the film and relay the information to the drilling and riveting head.

Three films are used to control the operations. A large spool controls the longitudinal run and cues two others at opposite ends of the work bed which govern the transverse run.



FILM-INDEXER guides the Drivmatic riveting machine developed by Convair and General Riveters, Inc.

BRAIN of film-controlled riveter is perforated 35 mm motion picture film.

## Computers:

New low-cost desk-size units broaden market for "brains."

Simplified, low-cost electronic computers, about the size of an ordinary office desk, may soon be carrying out many of the laborious calculations required for engineering and scientific investigations.

By modifying its standard business machines and inserting electronic circuits including a memory unit, Burroughs Adding Machine Co. has brought the cost of electronic brains within reach of many industrial concerns.

The new Burroughs E 101 is designed to sell in the \$30,000 price range. This compares with \$500,000 to \$1,000,000 for the so-called "Giant Brains."

In addition to comparatively low cost, the new Burroughs E 101 provides a written record of figures going into and coming out of the machine. Operation of the machine is comparatively simple, once the problem is set up.

### What It Handles

The new machine transfers information automatically to the computing mechanism. Data are introduced through a keyboard. When all of the computations have been completed, the machine prints the final answer at speeds up to 24 characters per second.

Potential applications for the new computers include problems in engineering design, quality control, pension plans, control of complex chemical operations and statistical work.

An outstanding advantage of the new computer is that tapes or punch cards are not required.

The machine readily supplies answers to problems involving compound interest and depreciation. At a recent demonstration in Detroit, computations of taxpayer's assessments according to an established formula and a water flow problem involving Bonneville dam were cited as problems coming within the scope of the new computing machine.

# FOUNDERS: Slim Down for Sales Fight

**AFS meeting stresses quality control, cost cutting . . . Automation grows up . . . Foundrymen ride out market shakedown . . . But no spring sales surge yet—By R. M. Lorz.**

The foundry industry is plowing through a market shakedown with surprisingly few casualties. Usual second quarter spring surge hasn't materialized so far. Labor costs also remain high and price of cast scrap has gone up recently in most areas. Added to these factors a price cutting flurry is putting individual operating practice to a severe test in many sections of the country.

Some automotive and farm equipment suppliers report second quarter business improved. A few foundries in the Chicago area are working on a 5-day basis.



NEW vice-president of American Foundrymen's Society is Bruce Simpson, National Engineering Co.

Generally, however, foundrymen have joined the rest of the business community in waiting for an expected upturn. Gray iron foundries are operating at about 75 pct of capacity on 3 and 4 day weeks. Malleable casting sales have improved about 5 pct since first quarter but are still running about 15 pct lower than last year. Steel founders continue to wait for some spark in freight car building and

automotive demand. Those who supply the automotive "Big Three" aren't pinched.

While foundry sales hopes have had to be temporarily deferred few people were bearish at the American Foundrymen's Society's 58th Annual Convention in Cleveland. Thousands of delegates who attended the biggest exhibit the society has ever sponsored apparently had already come to terms with tough market conditions back home. Many answered market questions with one of their own: "What's wrong with normalcy?"

### What It Takes

A few castings salesmen not yet adjusted to a contracting economy did complain that quotations in some areas were down to 8¢ per lb and it's well known that mechanized foundries are beating the bushes for business.

But most foundry vets still contend small jobbers can do more than break even if they have the knowhow. Small foundries which fail to slap rigid controls on costs and pricing methods can expect trouble. In the opinion of many observers firms which discount depreciation and other important factors to keep quotations attractive may be caught "selling the roof for a penny a pound."

Smaller foundries successfully adjusting to changed conditions are generally relying on three standard trump cards: service, control and cost-saving equipment.

### Automation Grows Up

There was plenty of the latter at this year's foundry show. Over 300 different suppliers jammed Cleveland's huge public auditorium to near capacity with over \$2 million worth of equipment. Everything from complete sand handling systems to portable injection machines was on display. Delegates

were in a buying mood, too, as over 25 pct of equipment was sold from the floor.

At least two obvious trends were easy to spot: (1) Automation had definitely moved out of the talking stage, and (2) portable melting and handling equipment is being streamlined and pushed.

Concentration on automatic shell molding machines was a standout. When AFS held its last exhibit in Atlantic City automatic shell molding was still a curiosity. At the show this year at least six different automatic shell molders were on display. Delegates showed particular interest in a completely new high-pressure diaphragmatic molding machine.

Despite high level of interest in automation most foundries have adopted a go-slow attitude. There weren't any novelty hunters at this



ELECTED as president of the foundry society was Frank J. Dost, Sterling Foundry Co.

convention. If a new piece of equipment can cut costs and improve casting quality founders are for it. As one gray iron man put it, "Automatic shell molding can't be beat on a lot of jobs. But as tight as today's market is, quite a few quality control experts are experimenting on many jobs to see if they can't get good results with green sand."

Automatic moisture control

units and sand reclamation systems were also popular at the Cleveland show. One foundry owner told THE IRON AGE his firm had saved almost \$5000 within the past year by installing moisture control computers.

Wherever possible foundries are also following the trend toward new pattern materials and use of gamma radiation for inspection. While standard radiography leaves nothing to be desired use of new tracer systems is increasing because of low initial cost. Resinous, fiberglass patterns are also being used more frequently.

Attendance at some 60 individual technical sessions was good. Quality-conscious founders placed heavy emphasis on processing molding sand at these meetings.

Frank J. Dost, president of Sterling Foundry Co., was elected president of AFS at the annual business meeting.

### Reactors Boost Appliance Use

Increased sales of electrical appliances in the Pacific Northwest are forecast if five utility firms report favorably on feasibility of constructing an atomic power reactor in the area.

Companies, under an agreement with the Atomic Energy Commission, are to complete their study and make recommendations after one year. Sharing the study's cost are Montana Power, Butte; Washington Water Power, Spokane; Pacific Power and Light, Portland; Portland General Electric, and Mountain States Power, Albany, Ore.

### How to Stimulate Slow Areas

Community actions to build new industries, stabilize existing business activities, and stimulate retail and service trade growth are suggested in a new "Community and Area Development Checklist" prepared by U. S. Commerce Dept.

It also calls attention to steps which a state can take to foster industry and commerce within its borders.

Copies of the checklist are sold by Commerce Dept. and its field offices for 5¢ each.

## TOOLS: Dealers Talk Taxes, Surplus

Annual convention of MDNA seeks cooperation from U. S. on Defense Dept. tool disposal . . . See favorable tax treatment ahead . . . Elect Nathans president—By J. R. Whipple.

Agreement between government agencies and the used machinery industry on an equitable program for handling the future disposal of the U. S. machine tool backlog was the prime topic at Machinery Dealers National Assn.'s 13th annual convention held in Philadelphia last week.

In an address at a luncheon meeting of 80 members from all parts of U. S. and Canada, held May 13, President Richard M. Nathans emphasized the importance of working toward a set policy for releasing machinery not currently in defense production to normal trade channels. Mr. Nathans also remarked that the industry was concerned by reports of government machine tools leased to manufacturers, ostensibly for defense work, being used for production of civilian goods thus inadvertently putting the Defense Dept. in competition with builders of new tools and dealers in used equipment.

### Hold 500,000 Tools

MDNA members learned of government's operations dealing with the tool backlog from the luncheon guest speaker, Mr. Howard Millburn, assistant chief of Production Equipment Branch, Office of Assistant Secretary of Defense.

Mr. Millburn said that he fore-

saw no wholesale disposal of any considerable number of Defense's estimated 500,000 pieces of production machinery. He expected a well-controlled, continuous, small-scale disposal program in the fairly near future aimed to pare off the non-essential and the obsolete.

He gave as an example equipment used to produce piston engines for aircraft. Although this type of engine is being replaced by jets to a great extent, he felt that there would be very little disposal of the piston-engine tools for another 5 years.

### Asks Leasing Code

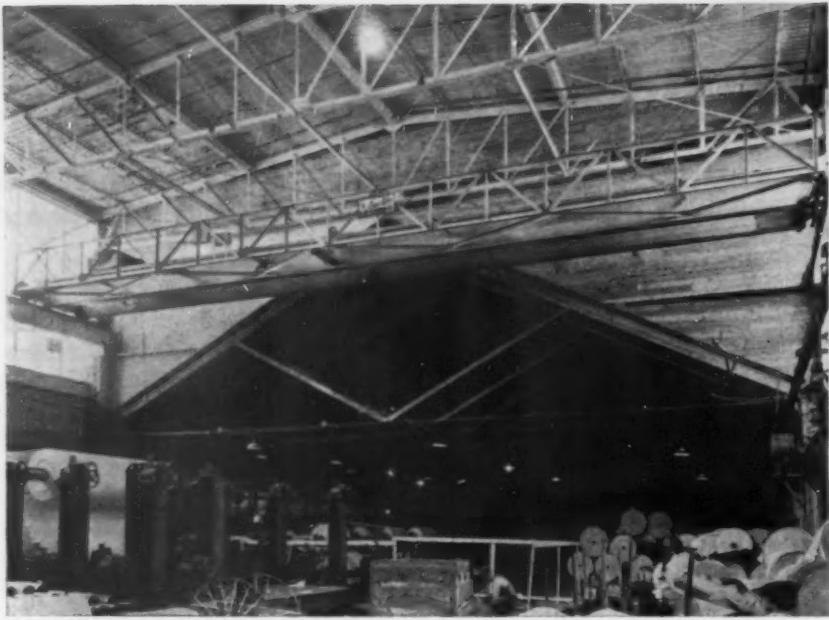
Mr. Frank Laurens, MDNA public relations chairman, made a strong plea for an industry wide uniform code governing the leasing agreements of both new and used machine tools. Judging from favorable convention reaction it seems probable to expect concrete action on this problem by MDNA in the near future.

Election of officers for the coming year took place Friday afternoon May 14. The entire slate currently holding office was re-elected: Richard M. Nathans, Brooklyn, N. Y., as president; Thomas J. O'Brien, Philadelphia, first vice-president; Benjamin Weiss, Detroit, second vice-president; Robert W. Rice, Chicago, treasurer.

In the convention's General Industry Meeting, President Nathans praised the work done by many members and MDNA Executive Director Randy Vinson in bringing the used machinery industry's case for inclusion of used equipment under accelerated depreciation clause of the new tax bill (H.R. 8300) before lawmakers and government agencies. Consensus on the floor was that the Senate Finance Committee would look with favor on the small manufacturer's need for equitable tax treatment.



"That's the ad business for you—last year I lost my agency and now I'm making a comeback."



## SERIES "D" *Load Lifter*<sup>®</sup> CRANES

...a new standard in  
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Series "D" All-Electric 'Load-Lifter' Cranes are today's most advanced cranes for average industrial needs. Standardization and mass production techniques make them available at prices far lower than other cranes designed for similar use. All types and capacities have performance-proved features like those in all "Shaw-Box" Cranes for the severest heavy-duty service.

Dependability and economy are inseparable in Series "D" 'Load Lifter' Cranes. Rigid three-girder construction prevents whipping and skewing. The motor and drive shaft are permanently aligned. Every bearing is a ball or roller bearing. The bridge and trolley wheel axles rotate on ball bearings, equally loaded, on each side of each wheel. All gearing operates in oil in sealed housings. Variable-speed magnetic controllers make spotting easy and accurate. Low maintenance, economical operation and complete safety for man, load and crane are assured.

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## Taxes:

Manufacturers fight adoption of proposed new tax form.

An Internal Revenue Service plan to institute a lengthy and more detailed form for reporting excise tax payments—expected to swell business bookkeeping costs—is being bitterly opposed by manufacturing interests in Washington.

Their representatives, joining those from transportation, commodity service and retailing industries, are scheduled to meet early in June with Assistant IRS Commissioner Norman A. Sugarman to try to kill form 720.

Prospects are that the moratorium, now extending through June 30, will be extended while the IRS completes studies of how to eliminate objectionable features.

### 'Unreasonable Burden'

As proposed, the new form would require detailed breakdowns for the total taxable sales or production, taxes rebated with purchase refunds or breakage, and total net tax payable. Figures would have to be listed separately for each taxable item.

Manufacturers complain that in addition to the cost of setting up new bookkeeping systems and hiring more personnel, the new form would place an "unreasonable burden" on business in the computation of amount of production material going into each item.

IRS officials argue that the new form will give them basis for making accurate field checks, required because the government is losing tax receipts from businessmen who take tax splits.



"You realize what this would cost you in a restaurant."



## DANUBE: Carries Strategics To Reds

**Balkan bootleggers sneak U. S. machines, metals down-river past Western control agency . . . Fence-sitting Tito holds the stopper to Russia-satellite supply pipeline.**

An old Austrian soldier's song goes like this: "The Danube is Europe's only eastward flowing river. On her broad back she will always carry goods and troops."

Today it's goods. Millions of tons annually of prohibited strategic materials are pouring into Russian-dominated Europe every year. A steady stream of U.S.-built trucks, locomotives, machinery and metals pass into communist hands before the eyes of hamstrung agents of the Coordinating Committee, the West's agency for strategic material control.

Tonnage figures and numbers of individual items are vague because of differences in definition of "strategic" items. For example, ricinous oil is not considered strategic by COCOM. But Russia considers it so and uses it for jets. Music wire is classified as strategic yet the tungsten carbide drawing dies to make it go through the Iron Curtain unhindered.

Basically, COCOM's "paper curtain," the strategic goods embargo,

does a great deal to stop the flow of critical material from the West to Russia and her satellites. It stands as a high hurdle forcing Iron Curtain traders into the more difficult business of dealing outside the law. But the Danube pipeline to the East continues to be a problem.

### End Up in Russia

Starting in the U. S. zone of Germany, the river flows through Austria and the port of Vienna (under four-power control since 1945). Thereafter the Danube forms the border between Communist-dominated Czechoslovakia and Hungary until it turns abruptly and flows south through Hungary for 100 miles.

For the next 177 miles the river runs through Yugoslavia, the only country not directly dominated by either East or West. On its last leg, reaching from the Yugoslav border to the Black Sea, the river flows between Bulgaria and Rumania, the other Balkan satellites,

**DANUBE** River is vital East-West trade route for Balkans.

and its mouth finally touches Russia itself.

When a barge or boatload of strategic U. S. machinery or materials reaches the Black Sea it can be transshipped to oceangoing vessels at any number of Russian or satellite ports such as Odessa, Constanta and Stalinograd, or loaded onto Russian freight trains at Galanti, Russia's lower Danube port.

### Fake Shipping Papers

From the Black Sea ports it is only a matter of time before a U. S. bulldozer or planing mill ends up in ports like Vladivostok, Port Arthur or Dairen. Thus visitors to Red China see new American cars on the streets and machines in the shops and angrily accuse U. S. export firms of violating the embargo on strategic materials.

At these accusations U. S. merchants and officials at COCOM headquarters in Paris can only wince and show documents indicating the legal sale of strategic goods to Austrian consignees.

Here's how the transshipments work:

1. A buyer operating in the Russian zone of Vienna, where COCOM agents cannot inspect books, clears his purchase of U. S. goods with a false declaration that they are destined for Austrian use.

2. In Austria the goods are loaded on a barge at Linz or Vienna and the false declaration of Austrian destination given to the seller. Then the strategic items are on their way down the Danube.

The Danube Commission is theoretically the organization to plug the hole in COCOM's embargo of strategics. This organization controls all river traffic. Each country on the Danube's banks has equal membership in the commission with the exception of Austria and Germany who lost their membership rights in 1945.

All present members of the

## International

Danube Commission except Yugoslavia (and Russia herself) are satellites. Yet these Russian-dominated nations last July voted unanimously for D. Djuric, a Yugoslav, to head the commission.

Tito, therefore, is in the position of being able to control Danube traffic. Without permission of Tito's Mr. Djuric no American, English or French representative can check shipping at any Danube port from Vienna to the Black Sea.

It's too much to believe that the Russian-dominated satellites put a pro-Western nation in control of the river as a gesture of defiance toward Russia.

A much more plausible explanation is the communists' realization that the West is courting Tito politically. Hence Free World countries will be wary of causing trouble for Djuric's river commission.

Tito, presumably pro-Western, must play economic ball with Russian satellites. Before World War II Yugoslavia sent 75 pct of her exports to the satellites plus Austria, Greece and Italy—received 72 pct of her imports from this same group.

### Squeeze Play On Tito

So Tito is caught in an unavoidable squeeze play between his country's political interests, which lie with the West, and the economic necessities which tie Yugoslavia to the East. Tito's position as boss of the Danube is somewhat comparable to the case of a Revenue Agent whose mortgage is held by a bootlegger.

Western powers are, of course, aware of the situation, but their position is equally paradoxical. If COCOM were to crack down on the Danube Commission and Mr. Djuric, it would probably bring Tito's fence-sitting act to a close and be instrumental in losing the West's only political foothold in the Balkans.

Western powers are willing to risk the illegal flow of strategics through the Iron Curtain in order to preserve Yugoslavia as a crack in Russia's armor.

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HY-TEN "B" No. 3X bars are used for a wide range of applications. A trial order will convince you of their true economy. Just call your nearest WL representative.

Write today for your FREE COPIES of Wheelock, Lovejoy Data Sheets, indicating your title and company identification. It contains complete technical information on grades, applications, physical properties, tests, heat treating, etc.

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## UNION: USW Seeks Higher Pensions

Steelworkers claim present pensions are outdated by higher cost of living, social security changes . . . Cost to company is 10.5¢ per hour—By J. B. Delaney.

One of the principal objectives of the United Steelworkers in the current contract negotiations with steel producers is an improved pension program.

David J. McDonald, union president, says the present program, in effect since early 1950, is inadequate. He cites increases in cost of living and changes in the social security law which have lessened the cost to the steel companies.

### What Pensions Cost

Mr. McDonald also is aware that Congress may enact at this session legislation supported by President Eisenhower calling for increased pension payments under social security.

The steel industry pension program is tied in with social security. Minimum pension for a worker with 25 years' service is \$100 per month, including social security. Thus if a man is entitled to SS benefits of \$85, his employer makes up the difference. If SS benefits were boosted and the existing pension program remained unchanged the company contribution would be decreased.

Pensions last year cost the steel companies an average of 10.5¢ an hour. This figure includes all the money set aside for pension purposes divided by the number of man-hours worked in 1953. It does not mean that the steel producers actually paid out that much money to men now receiving pensions. Part of the total represents dollars put into funds to meet past service liability.

### Total Cost Is 14.6¢

For instance, U. S. Steel Corp. estimated in March 1950 that its past service liability amounted to \$496 million. Last year it deposited \$64.4 million, and in 1952, \$58.4 million in a trust fund to cover past service. This brought total funding deposits of U. S. Steel

up to approximately \$149 million.

But whether for funding or for current pension payments, actual cost to the steel producers was 10.5¢ an hour. On top of this, SS taxes paid by the companies averaged 4.1¢ an hour for a total of 14.6¢ for pensions and SS.

### How Formula Might Change

THE IRON AGE attempted to learn how much pension costs would increase should the minimum pension be boosted, say, from \$100 to \$137.50 per month. But even the experts hesitated to give a firm answer due to many variables. It was pointed out that if the minimum for 25-year men were increased, workers in other service brackets would receive proportionate boosts. This would require a change in the formula.

The present formula is 1 pct of average earnings in the last 10 years multiplied by the number of years worked. If the minimum were increased it might be necessary to raise the percentage factor to 1.25 pct or more unless some other variation could be worked out.

On the surface it seems the cost increase for steel producers would

be considerable assuming that the 25-year minimum were unchanged, and that there was no change in SS benefits. For example, the \$100-per-month pensioner who receives \$85 from SS gets \$15 from his company. An increase of \$37.50 would represent a 250 pct boost in the company's liability.

As another example, if the percentage factor in the formula were increased from 1 pct to 1.25 pct, a 40-year man who averaged \$400 per month would be entitled to a pension of \$200 per month compared with \$160 under the present formula. If he receives \$85 from SS, the company's liability advances from \$75 per month (the difference between \$85 and \$160) to \$115 per month (the difference between \$85 and \$200), an increase of \$40.

## Worker-Owners Split \$3 Million

Employees of Cleveland Pneumatic Tool Co. have split a \$3-million-melon in their first year as sole owners of the nation's largest aircraft landing gear plant. Pneumatic workers put almost \$2 million into two profit sharing trusts in addition to realizing another \$1 million in gross earnings from profit sharing investments.

### Establish Trust Funds

Under terms of an agreement conceived by president Sam S. Mulkin in 1952 a total of \$1,910,749 was distributed to separate trust funds set up for salaried and hourly workers. Cash payments amounting to \$269,149 went to 1632 eligible hourly employees. Another \$1,438,796 went into hourly workers' trust on a proportionate basis. While salaried workers received no cash payment, a total of \$202,804 was deposited in their trust fund. Some \$650,000 went into the trusts from the additional \$1 million gross earnings.

Employees took over the Cleveland plant in January 1953 after agreeing to pay Textron, Inc., of New England a total purchase price of \$11,800,000. Down payment of \$2,150,000 was made with balance to be paid out of company and profit sharing dividends over the next 14 years.



"He's at that awkward age—18 to 65—got to work for a living."

## PLATING: Detroit Checks All Angles

Continuing nickel shortage spotlights plating research . . . Brightwork still major automotive headache . . . New Udylite lab probes new methods, compounds—By R. D. Raddant.

If a contemporary alchemist turned up in Detroit offering his services to the auto industry, chances are he would be put to work creating nickel or a nickel substitute.

Harassed automakers and platers have just about reconciled themselves to the unpleasant conclusion that the nickel shortage will be with them for some time to come.

### Major Auto Problem

As a result, plating research is becoming more and more important. Chemists and metallurgists are working overtime to develop the materials and methods that will provide the most lustrous and lasting brightwork.

While anti-corrosion work of other industries is always important, in Detroit the demands for quality and quantity by the auto industry overshadow plating problems of diverse industries.

Importance of plating research is graphically illustrated in the new laboratory of Udylite Research Corp., research division of Udylite Corp., Detroit.

In the six specialized labora-

tories, pilot plating plant and furnace room, Udylite's researchers are hard at work developing new plating compounds, techniques and processes.

R. A. Fellows, general manager of the Research Corp., breaks down his division's work into five major categories: preparation of the surface, sequence of metals, electro-deposition, racking of the work, and final preparation of the finished product.

One of the key departments is the organic synthesis laboratory where chemists are probing the hundreds of thousands of organic compounds, seeking out those that when added to the plating baths will produce the most desirable luster.

### Pilot Lab Vital

In the analytical department, the work involves development of new methods of analysis for new compounds of the plating baths.

Electro-chemical laboratories are devoted to this branch of the industry and in the metallurgical section studies of thickness, hardness and physical properties of the plating are made.



PLATING LAB has two bays of tanks for acid processes, one for alkaline. Complete controls are provided for.

Combined results of these four departments reach the final test in the pilot laboratory. When research has developed a potential new product or process, it is put to the test in the pilot lab. If it is successful there, it is tried out in an actual plating plant.

Dr. Henry Brown, director of research, lists the problems of research in this order:

1. Development of baths to produce bright plating, but requiring less polishing of the basic material to develop a pleasing finish.
2. Better adhesion.
3. Study of substitutes, especially for nickel.
4. Anti-corrosion.

But researchers are convinced that in spite of all the improvements that are being made, nickel is still the key to successful plating of lasting bright finishes. A lot is being done on design of the plated part, so thickness will be uniform and smooth. Surface treatment is also important in the basic metal and the finished part.

### Defense

#### Contracts Reported Last Week

Including description, quantity, dollar values, contractor and address. Italics indicate small business representatives.

Sleeves, 260250, \$387,773, Universal Winding Co., Providence, R. I.  
Ammunition component boxes Mk. 293505, \$1,015,800, Universal Pin Co., Brooklyn, N. Y.

Gun fire control system Mk 56, \$90,817, 202, General Electric Co., Washington, D. C.

Launcher, grenade M7A3, 37639 ea, \$158,082, Dockendorff & Co., Inc., Bridgeport, Conn.

Driver, expander, extractor, spark plug insert, facer, gage, spark plug insert, tools, inserting, tangs, taps, etc., 17337, \$286,562, Heili-Coil Corp., Danbury, Conn.

Lathe, right angle, T type, 1, \$51,538, The Lodge & Shipley Co., Cincinnati, Ohio. Testers, generators, sharpeners and accessories, 41, \$35,281, Gleason Works, Rochester, N. Y.

Saw-knife, assembly, survival, ice and snow, 7304, \$73,994, Huron Metal Products, Brooklyn, N. Y.

Centrifugal oil purifier (549-748) 20, \$132,350, The Sharples Corp., Philadelphia, Pa.

Dehumidifier, desiccant, electric, 300, \$440,055, Daly, Merritt & Sullivan, Inc., Virginia.

Recorder-reproducer, 216, \$208,852, American Measuring Instruments Corp., Long Island City, N. Y.

Spare parts, class 03H, \$153,874, American Bosch Corp., Springfield, Mass.

Auto spare parts, 1410, \$675,628, GMC, GMC Truck & Coach Div.

Crawler tractor spare parts, \$200,603, Caterpillar Tractor Co., Peoria, Ill.

Semi-cab fire trucks, 33 ea, \$301,849, General Fire Truck Co., Detroit, Mich.

**Planning****REPORT TO MANAGEMENT..****Don't pigeon-hole building plans**

Do it now--if you're thinking about putting up a new plant or adding to an old one. Current favorable market for potential construction customers may not be matched again for many years.

**Working for you:**

Supply of building materials is plentiful. This means there'll be no costly construction delays.

Money's soft. Big lenders are out hunting for takers--you'll get a better deal on interest rates right now than seems probable next year.

Prices have stabilized and no general wage increase for construction workers is expected during the rest of '54.

Competition among contractors is stiff despite the fact the construction industry's been riding a boomcrest throughout '54. Bids are being pared reasonably close to the bone.

Same holds true if you're a prospective home builder. You can figure your dream plan will cost more next year than it does right now.

**Ike was right**

Recent government figures showed jobless total was down more than a quarter million in April, marking the first decline since last October. The change was seasonal and an increase in unemployment can be expected during June. But the April figure does serve as another indicator the President was right in gambling that the recession would turn tail without the need of costly inflationary stimulants.

Ike took a chance that required great courage. It would have been a much easier, more popular move to rush in with stopgap aid to postpone the economic adjustment that we had to face some time. But he and his advisers figured we'd come out of the recession all right. They doped it out correctly.

**Democrats will howl**

Despite this, you can expect that the Democrats will still make a big issue of recession during their election campaigns a few months from now.

By fall we'll just be coming out of the usual summer slump, and since we aren't headed for another real boom for at least 2 years, the Democrats will have statistical ammunition to indicate the recession's still holding, even though it won't be.

**Let 'em have coffee**

Is your company planning to drop a small bomb? Maybe it's a new product, improved production technique, or a change in company policy. It's important, newsworthy, needs to be explained at a press conference--but you don't think it's quite worth the expense of an elaborate news luncheon or even a lush cocktail party to get your message across.

What can you do? Check the possibility of a 9:30-10 am "second breakfast" press conference. Coffee'll be enough.

You'll find it's cheaper, quicker, may get a better press turnout because it's novel, won't conflict with other similar affairs, may give reporters a better break on meeting their deadlines.

## Industrial Briefs

**Office Opened . . . A M E R I C A N BRAKE SHOE CO.** has opened a new sales and technical service office in Duluth to serve the various mining companies in that area. John V. Houston, Jr., has been assigned to head the new office.

**New Dealer . . . REPUBLIC STEEL KITCHENS**, Canton, Ohio, appointed Midwest Kitchen Specialists, 2126 Lyndale Ave. South, Minneapolis, as a dealer.

**New Arm . . . G A R W O O D INDUSTRIES**, Wayne Div., has appointed Albuquerque Truck Equipment Co., a distributor.

**Completed . . . DRAVO CORP.'s Contracting Div.** has completed construction of a new dock in the Ohio River at Huntington, W. Va. for the Esso Standard Oil Co.

**Introducing . . . SOLAR STEEL CORP.** is introducing a complete inventory of plates in all thicknesses and in large sizes into its Hanover plant at Union, N. J. This inventory will serve metropolitan New York, New Jersey, Philadelphia and outlying areas.

**Moves Office . . . LURIA STEEL & TRADING CORP.** moved its Pittsburgh district office from downtown Pittsburgh to the Alderdice Bldg., 1 Cedar Blvd., Mt. Lebanon, Pittsburgh recently.

**Producing . . . ZIRCONIUM CORP. OF AMERICA** is producing pure (monoclinic) zirconium oxide. Pure zirconium oxide is useful where extreme purity is required for chemical reactions.



SINTERED TUNGSTEN carbide and tool steel production methods are outlined by W. R. Davis, left, general supervisor of the sintering department of Firth Sterling's McKeesport, Pa., plant, to Dr. Luiz C. Correa Da Silva, center, production manager of Brazil's Brassinter S. A., and Dr. Vicente Chiaverini, general manager of the Brazilian company.

**Canadian Plant . . . EUTECTIC WELDING ALLOYS CORP.**, Flushing, N. Y., reports that its subsidiary, Eutectic Welding Alloys Co. of Canada, Ltd. has acquired a new plant at 3150-37 St., Ville St. Michel, Montreal, P. Q., for the manufacture of its special purpose alloys in Canada.

**A Proposal . . .** Mathieson Chemical Corp. and Olin Industries, Inc. board of directors voted unanimously to submit to their stockholders at special meetings in June a proposal to merge the two companies.

**Conference . . . THE COOPER ALLOY FOUNDRY CO.**, Hillside, N. J., has sent invitations to design engineers concerned with cast stainless steel components to attend an unusual all-day conference, Thursday, June 24, as its guests.

**Full Ownership . . . THE GARRETT CORP.**, Los Angeles, is assuming full ownership of Aero Engineering, Inc., Akron, Ohio, Aero Sales Engineering Ltd., Ottawa, Canada and Air Cruisers Co., Belmar, N. J. Frank W. Miles, has been appointed vice-president in charge of these companies.

**Change of Plans . . .** A new iron ore carrier being built for NATIONAL STEEL CORP. will be floated from drydock in the Lorain, Ohio, yards of American Ship Building Co. in July and will enter service during the current season instead of next year as originally scheduled.

**Breaks Ground . . . JOSEPH T. RYERSON & SON, INC.** broke ground recently for a new building at 6500-7 Mile Rd. East, Detroit for the Concrete Reinforcing Steel Div. New unit will operate as a branch of the company's main plant at 1600 E. Euclid Ave.

**Congrats . . . MICROMATIC HONE CORP.**, Detroit, celebrated its 25th Anniversary recently.

**Almost Ready . . . W E I R T O N STEEL CO.**, Weirton, W. Va., Div. of National Steel Corp., expects work on an electrical substation in its sheet mill yard to be completed about July 1.

**Elbow Room . . . G A R R E T T CORP.** board of directors approved a \$300,000 addition to the engineering section of one of its corporate divisions. Expansion will be at AiResearch Mfg. Co.'s Phoenix, Ariz., plant.

**Big Doings . . .** Over 210 persons attended the May 5 meeting of NATIONAL ASSN. OF WASTE MATERIAL DEALERS, INC.'s Atlantic Div. at the Hotel Warwick, Philadelphia.

**Subsidiary Formed . . . CLARK EQUIPMENT CO.**, Buchanan, Mich., has formed a new subsidiary, Clark Leasing Corp., to finance leasing of its equipment on a national basis.

**Dedicated . . . G E N E R A L E L E C T R I C CO.**, Schenectady, officially opened and dedicated its new \$25 million plant at Rome, Ga. With nearly a half-mile of conveyors, new processes, and new machinery, GE has succeeded in reducing by more than one-third the manufacturing cycle for certain size transformers.

**Consolidating . . . C H R Y S L E R CORP.** will consolidate all its West Coast passenger car assembly and body operations in the company's Los Angeles plant by the end of 1954.



*for every use...in every industry  
...more use per dollar*

## R/M HOSE

Raybestos-Manhattan makes Homoflex hose as flexible as a rope for handling air, water and for other uses. Workmen like it because it's light, easy to handle—yet strong. At the other extreme, R/M makes the world's largest and sturdiest hose for suction and dredging . . . and the world's safest hose for oil drilling, ship loading and other high pressure

services. For every use, from  $\frac{1}{4}$ " paint spray to hose large enough for a man to crawl through, R/M's engineering and production are geared to give you "more use per dollar" from every length you buy.

You get more use per dollar too, in R/M transmission, conveyor and V-belts and other industrial rubber products. Consult an R/M representative.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

## RAYBESTOS - MANHATTAN, INC.



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Hose



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Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls

RM-413

# The Automotive Assembly Line

## Clean Engines Have Longer Lives

**Filters, ventilation are weapons in battle to cut engine wear  
... Screen out dirt, flush out corrosive acid fumes ... Chrysler  
uses six devices—By R. D. Raddant.**

It sometimes seems that today's automobile engine has a perverse side that insists on destroying itself.

As if it isn't a big enough problem to keep a clean new engine running smoothly, the engine itself creates its own sources of wear and corrosion.

Because of its high intake of air and low engine pressures, countless particles of dirt and dust are sucked into the engine with the thousands of cu ft of air the engine breathes every few miles of driving.

Engine operations have their own chemical reactions which result in harmful acids and compounds that eat into metal or otherwise gum up the works. And there are always the minute particles left in the new engine regardless of the most careful manufacturing and assembly operations.

To combat these trouble sources, auto engineers have developed protective devices that filter and cleanse oil, fuel and air to insure trouble-free engine operations and many thousands of miles of driving with few engine repair bills.

**Pioneered At Chrysler . . .** Engines in Chrysler Corp. lines, where much of the filtering and cleansing work was pioneered (Plymouth was first low-price car filter-equipped), are protected by these six devices: oil filter, oil-bath air cleaner, oil filter cap air cleaner, Oilite fuel tank filter, floating oil intake, and crankcase ventilation system.

The replaceable-element oil filter is perhaps the most important of the devices and the one sub-

jected to the most criticism. Many know-it-all mechanics say that dirty oil is actually a better lubricant or that regular oil changes make the filter unnecessary. These theories are both disproved by wear tests and oil sediment evaluation.

Dirt particles can form an efficient lapping compound that can increase clearances and cylinder bore diameters. Serious damage from scoring can result from particles larger than the thickness of the oil film.

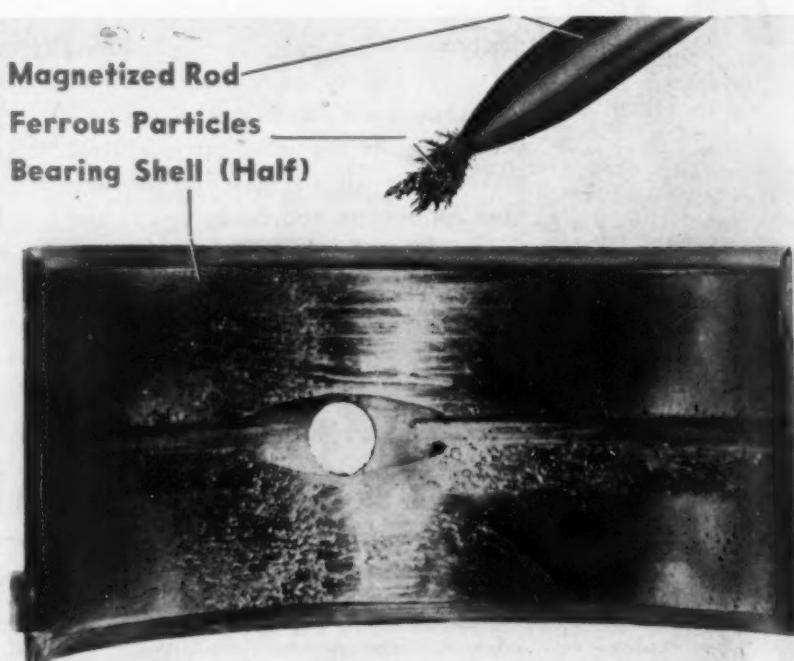
**Oil Through Paper . . .** Chrysler cars use a replaceable "paper radial" oil filter unit made from a special resin-impregnated filter paper. Folded in pleats, it makes available a filtering surface vary-

ing from 570 to 900 sq in. Chryslers have a full-flow filter where all oil is filtered each time it passes through the lubrication system; Dodge and DeSoto V-8s a shunt filter; Plymouth and other 6-cylinder lines a by-pass filter.

The engine itself creates many harmful chemical compounds that can result in serious corrosion through acid action or as a binder for carbon particles causing sludge. Halides in ethyl fluid and sulfur in oil and gasoline cause dangerous corrosive acids, but these are mostly confined to crankcase sludge and are successfully removed by filters.

Minor drawbacks of the filters are that they remove oil additives and that tetra ethyl lead in fuel results in an oxide which, although not harmful, results in filter clogging. Increased tetra ethyl has resulted in recommended filter element changes at 5000 miles instead of 8000 miles. Only about 30 per cent of the additive is removed by the filter and this is not considered a serious disadvantage.

*Turn Page*



BEARING SHELL shows how oil-born ferrous particles score working surfaces.

Clean Air, Gas . . . Taking up briefly the other protective devices, the floating oil intake supplies the pump from just below the surface of the oil in the crankcase. With heavier particles settling on the bottom, only clean oil is taken into the lubricating system. Air bubbles are also avoided by the below-the-surface intake.

The oil bath air cleaner filters the air going into the carburetor. Filter element in Chrysler's unit is curled animal hair, coming from the end of a steer's tail. This cleaner can remove over 98 pct of dirt from the air passing through it. The self-washing oil bath gives the filter a long service life.

Oil filler cap air cleaner collects dirt from air drawn into the crankcase.

The crankcase ventilation system flushes harmful combustion gases from the engine. If left to remain, they would mix with water vapor in the crankcase to form corrosive acids or act as a catalyst in sludge formation. Removal is done by a flow of air coming through the oil filler pipe cap above the engine block.

The Oilite fuel filter is located in the gas tank where it prevents chips, dirt and water from leaving the fuel tank. It consists of an Oilite powdered metal disc of small grains of bronze fine enough to prevent passage of dirt.

**V-8 For Plymouth . . .** In the engine department, it is practically assured that the new Plymouth V-8 will be turned out on Dodge's Red Ram engine facilities. Plymouth people will insist it is a Plymouth engine, but it will actually be a smaller version of the Dodge with a smaller bore and minor variations.

This will also put an end to rumors that Dodge will peddle its engine to an independent as Plymouth's demands should more than take up the excess capacity on Dodge lines. At a rumored 140 hp, the Plymouth engine should give Ford and Chevrolet a run for their money.

## Sales:

### Chevrolet, Ford, Buick leaders today . . . Record for Olds.

It's becoming more and more apparent that the only thing wrong with auto production this year is in its distribution, not its totals.

*Ward's Automotive Reports*, the more or less official production counter of the industry, put the first 4 months of this year in a close third place in production history.

The best first 4 months were in 1953 when the post steel strike production race brought out 2,121,367 cars in the January-April period. In 1951 the total was 2,118,336 cars for the same 4-month period.

The new top three, with Buick replacing Plymouth behind Chevrolet and Ford, is now accounting for 63 pct of weekly production in the U. S. Elsewhere, in a typical week, Plymouth lost 3 days due to labor trouble, Hudson and DeSoto

### Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
May 15, 1954	128,013*	23,784*
May 8, 1954	130,717	23,823
May 16, 1953	150,360	26,945
May 9, 1953	149,075	30,546

\*Estimated. Source: *Ward's Reports*

were down 1 day, Packard started a 2-week shutdown, Studebaker suspended car assembly, and Nash reduced its output.

### Chevvie Moves Ahead

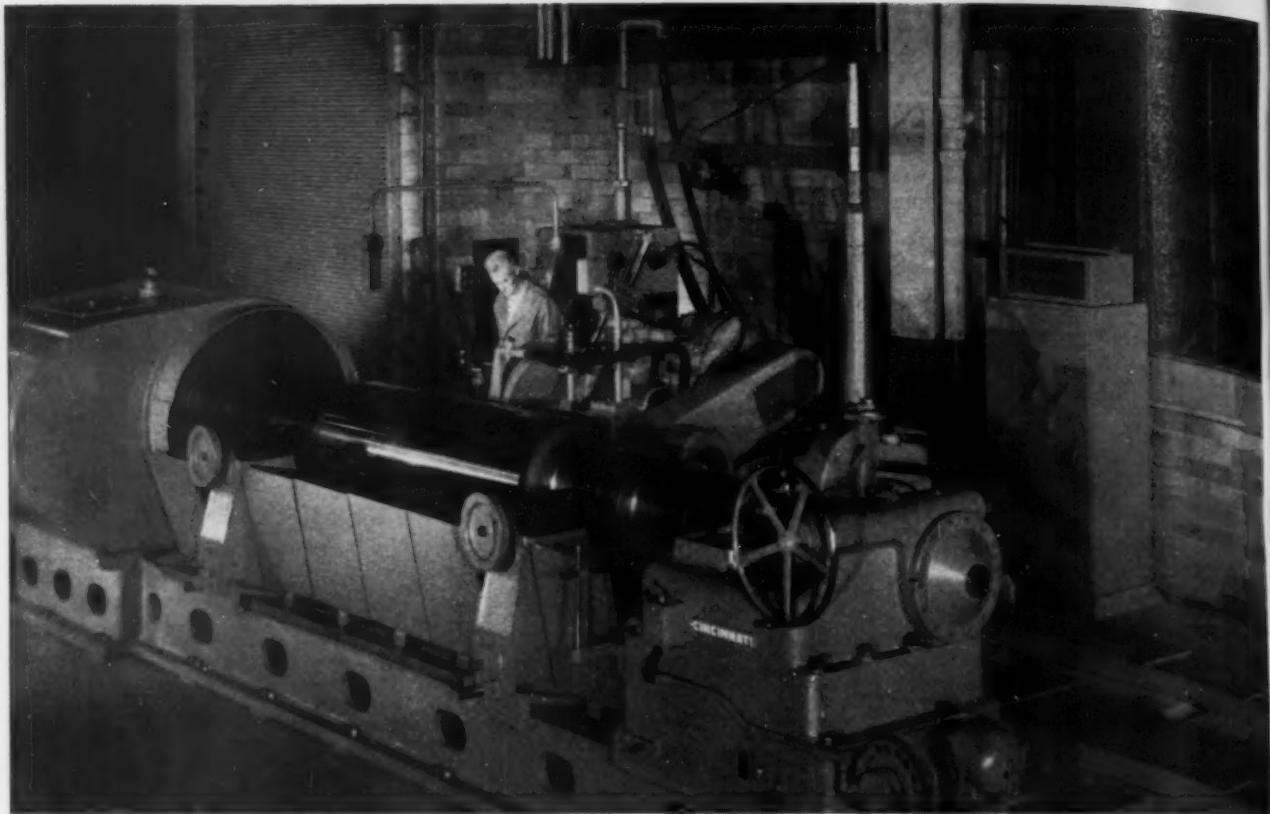
An alltime monthly production record by Chevrolet pushed this GM division past Ford into first place. Chevrolet actually turned out 140,586 cars during the month for a 4-month total of 499,351, also a record.

Meanwhile, Cadillac boasted that more Cadillacs were delivered to customers during March and April than in any 2-month period in its history; Oldsmobile reported a record sale for April.

## THE BULL OF THE WOODS

By J. R. Williams





CINCINNATI FILMATIC 60" x 240" Traveling Wheelhead Roll Grinder

## For Lower Cost, Better Quality Finish on Sheets and Foil

... equip your Roll Shop with CINCINNATI FILMATIC ROLL GRINDERS

Low cost in roll grinding depends largely on the grinding wheel spindle bearings, for that's where down-time and maintenance usually start. FILMATIC spindle bearings, an exclusive feature of CINCINNATI Grinding Machines, completely eliminate bearing maintenance expense. And they require no adjustment when changing from one type of roll grinding job to another. Other advantages offered by CINCINNATI FILMATIC Traveling Wheelhead Roll Grinders include built-in automatic wheel balancing; infinite number of grinding rates through electronic control of carriage traverse; automatic lubrication with filtered oil; wide range of convex and concave cambers obtained with double eccentric, tilting wheelhead cambering unit. Our roll grinder specialist will be happy to tell you more about these machines and their relation to high-quality, low-cost rolled products. May we hear from you?

**CINCINNATI GRINDERS INCORPORATED**  
Subsidiary of The Cincinnati Milling Machine Co.  
**CINCINNATI 9, OHIO**

### Specifications



### Traveling Wheelhead Roll Grinders

four sizes .....	36", 44", 50", 60"
length between centers.....	up to 24 ft.
infinite work speeds.....	36"—9 to 32 rpm 44"—8 to 28 rpm 50"—7 to 25 rpm 60"—6 to 21 rpm
infinite carriage traverse rates.....	3/4" to 75" per min.
power rapid cross traverse.....	20" per min.
motor drives: wheelhead.....	30 to 40 hp
headstock .....	up to 30 hp
wheel carriage .....	1½ hp



**CENTERTYPE GRINDING MACHINES • CENTERLESS  
GRINDING MACHINES • CENTERLESS LAPING  
MACHINES • MICRO-CENTRIC GRINDING MACHINES**

## This Week in Washington

### More Defense Orders Will Be Coming

**Increased Red pressure will force government to step up defense spending . . . But it won't be anywhere near Korean level . . . Renegotiation proposal—By G. H. Baker.**

New build-up in anti-communist defenses around the globe is in the offing.

Neither the Administration nor Congress is quite ready to spring its new defense-spending plans, but the trend of recent military and diplomatic decisions in Washington is a definite tip-off that arms spending, both at home and abroad, is to go up.

To business and industry, the build-up spells more government business but nothing like the volume issued for Korea.

**Ask Bigger Budget . . .** Military leaders are convinced that the deteriorating Asiatic situation requires increases in the U. S. defense budget. Senator Maybank, D. S. C., predicts the Administration will be forced to restore the two army divisions lopped off under the Wilson "new look" program, and will find it necessary to accelerate Air Force procurement. At least \$3 billion will have to be added to the overall defense budget for the new fiscal year starting July 1, Sen. Maybank believes.

His figures probably are a little overboard as to size, but it seems clear that President Eisenhower soon will ask Congress for an additional military appropriation of between \$1 and \$2 billion, citing U. S. obligations to police the free world.

**No Discrimination . . .** A tightening-up of federal rules against racial discrimination is being put into effect. All firms doing business with the government are affected by the new regulations.

In the past, many companies

holding government contracts have winked at the so-called non-discrimination clause which is standard in all prime contracts drawn up by the government. Government lawyers were reluctant to prosecute the firms because of political pressure.

The rewritten clause which is being inserted in all new government contracts forbids discrimination based on race, color, religion, or national origin, and requires employers to post notices to this effect in conspicuous places.

**Restore Renegotiation . . .** Renegotiation of government contracts and subcontracts, blanketed out since Dec. 31 when the law under which it operated expired, probably will be back on the books before long. Plans approved by the Senate call for the new renegotiation law to be retroactive to Jan. 1, 1954. Changes approved by the Senate include the following:

Minimum amount subject to re-



### Now You Know (?)

In case you've been wondering why some of your employees have trouble making decisions, there's a new government publication, "Decision Making," now on sale that explains why some people go crazy trying to separate big potatoes from little potatoes. It was prepared for the Navy by Stanford University. Persons of similar intellectual capacity may vary greatly as to their ability to make decisions, the authors point out, and then go on to state (for whatever it's worth) that the functioning of the ego-control variable and the ability to channel thought processes have a lot to do with the art of deciding—be it a business decision or a military decision.

negotiation is \$250,000 for fiscal years ending before June 30, 1953, and \$500,000 for fiscal years ending on or after June 30, 1953.

**Who Buys It . . .** Facts for the business with something to sell are presented in the *U. S. Government Purchasing Directory*, a new publication telling who buys what commodities for military and federal civilian agencies.

Listed in the 92-page directory are some 4000 classes of commodities covering the 5 million-plus items bought by the government. The publication is called the first complete guide to federal purchasing activities. It is sold by Superintendent of Documents, Washington 25, D. C., for 50¢ per copy.

**Must Be Current . . .** Government data on construction machinery requirements must be kept up to date in order to be of any value during a national crisis, Business & Defense Services Administration is told.

Construction machinery manufacturers pointed out to BDSA re-

inder  
oil

ers  
50", 60"  
32 rpm  
28 rpm  
25 rpm  
21 rpm  
per min.  
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## The shape of things to come

It is difficult to predict the shape tomorrow's air power will take. But one thing is certain — fabrication of many of the component parts, such as rings, bands, and the complicated assemblies will be accomplished by welding.

If a new alloy — a special metal — an intricate assembly pose a problem to design or manufacture perhaps our specialized knowledge gained in 35 years of welding fabrication can help to find a practical and economical solution. Our Product Development Division will be glad to put experience gained from working with every major U. S. jet engine manufacturer to work for you. In addition to fusion and resistance welding of ferrous and non-ferrous metals, American Welding can provide designing, engineering, metallurgical and machining facilities.

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## Washington News

ently the great importance of their products for such purposes as the removal of wreckage after a bombing attack.

Regarding peacetime problems, the representatives are making a strong bid for elimination of the necessity of getting export licenses on shipments to countries outside the Western Hemisphere. Small-quantity shipments, it is argued, are not "militarily strategic" to any importer of these types of machinery items.

**Guarantees Needed . . . Biggest problem for domestic producers, EDSA is told, is that of meeting competition abroad when no U. S. government guarantees are provided to encourage long-term contracts with foreign buyers. This lack is in contrast to the financial backing foreign exporters receive from their governments in similar circumstances.**

### Trade:

#### Ike gets less than he wants on reciprocal trade act.

President Eisenhower will settle for a simple 1-year extension of the Reciprocal Trade Agreements Act in the face of limited support—and some open hostility—met by his liberalized trade-tariff program in Congress.

The White House, realizing this, is expected to try and have some of the Randall Commission recommendations lowering trade barriers included in the extension bill.

But there is little prospect that any tariff cutting will develop in Congress this session. Many lawmakers are fearful of antagonizing powerful high-tariff elements back home.

If the present law is extended in its present form, there is virtually no possibility of further administrative tariff reductions this year. Most of the tariff-cutting authority in the present law has been used up and there is considerable reluctance abroad for a

multi-national conference now unless this country is prepared to make substantial concessions.

The Eisenhower program, calling for a 3-year trade act with additional authority to gradually reduce selected tariffs, is aimed at two fronts:

(1) Combatting the growing peril of Russian aggression in the economic sphere which could open the way to a dangerous re-alignment of economic groupings away from the West if now-friendly countries can't successfully trade with the U. S.

(2) Removal of a "patchwork of temporary expedients and a host of restrictions" which he believes impede world trade.

#### Ike's Stand

This would be accomplished by stimulating American investments abroad as well as by reducing tariffs to encourage an increased foreign trade.

The President's position is clear: Stop filling the dollar gap; help close it by raising the level of international trade and investments.

Mr. Eisenhower's trade-tariff program will be presented to Congress again next year. The same controversial views that erupted

this year will have to be met again: Powerful retail and consumer groups supporting the program, but calling it too weak versus equally powerful manufacturing and commodity interests, which oppose the present program, bitterly fighting the proposed liberalization.

### Seaway May Spur Trucking Use

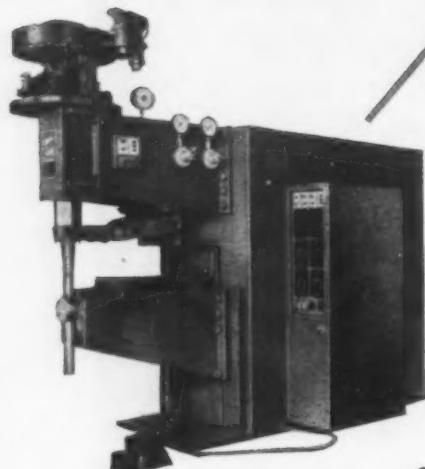
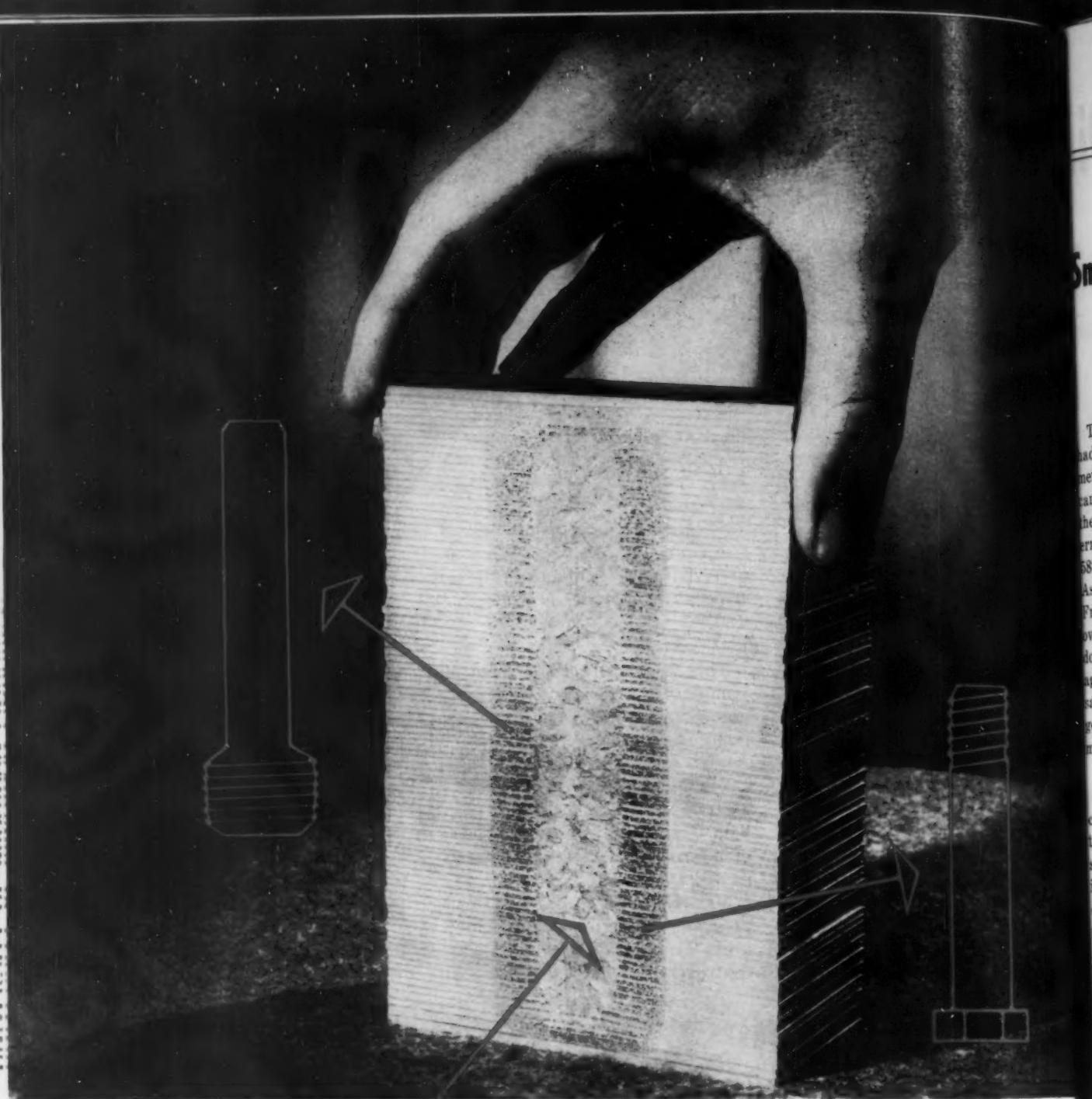
Approval of U. S. participation in the development of the St. Lawrence Seaway is leading to speculation that midwestern trucking companies will find eventual benefit in the waterway.

Today, a manufacturer in Indianapolis or Cincinnati may still be reluctant to send his products away by truck for Atlantic ports, where they would be loaded aboard ocean-going vessels. Because of long practice, he may still rely on rail transportation for this operation.

When the shipping that will carry his goods to Stockholm, Liverpool, and Aden can dock at such ports as Cleveland and Toledo, the manufacturer is likely to consider the advantages of quick factory-to-dock service by truck. The same principle may work in reverse if this businessman imports raw materials from abroad.



PRESIDENT signed St. Lawrence Seaway bill last week, ending a 30-year struggle. Bill makes possible ocean-going traffic to Great Lakes.



## **Spotwelding of Scrap Sheet Titanium Forms Solid Ingots for Machined Parts**

A six inch pile of 85 laminations of .064 titanium with two laminations at each end of .091 titanium is joined with one weld on a Sciaky type PMCO 6ST 400 KVA Three-Phase Spot Welder. The weld nugget forms a solid ingot of virgin metal at least as strong as the parent metal. This ingot can be machined into a variety of titanium parts. Months of lead time required for titanium is avoided and expensive scrap is utilized.

Developed by the Manufacturing Research and Development Unit of the Glenn L. Martin Company, this technique offers another fine example of Sciaky basic thinking in design of resistance welding equipment to do more useful work at lowest operating cost with maximum reliability.

*Largest Manufacturers of Electric  
Resistance Welding Machines in the World*

**SCI AKY**

4923 West 67th Street, Chicago 38, Illinois

## West Coast Report

### Small Steel Buyers Get a Break

Steel mills, warehouses, credit men welcome small tonnage purchasers . . . Last year they got cold shoulder . . . Mills now undercut warehouse prices—By T. M. Rohan.

The inventory adjustment has had at least one happy facet in the metalworking industry. Steel users can pay their bills easier because they're not buying so much. Western credit men playing host to the 58th Congress of the National Association of Credit Men in San Francisco this week said the turnover of accounts receivable is down only modestly from a year ago—nothing like the drop in sales. In addition, credit men are getting a welcome chance to check more closely.

**Smaller Sales . . .** Much more consideration is also being given to new and smaller accounts which salesmen are turning up by beating the bushes. During the heat of plate shortage, for instance, many smaller customers did not get top service from mills and now find salesmen lined up at the door.

Potential customers, formerly turned down as poor credit risks, are now getting much closer scrutiny although credit men say standards have not changed and they are not leaning backward for marginal accounts, although in many cases salesmen are insistent.

"Belated Normalcy" . . . S. J. Haider, Minneapolis, Association's secretary-treasurer, told THE IRON AGE that nationally collections have slowed down and the trend is expected to continue. "But it's nothing to worry about at all," Mr. Haider said, "only a belated return to normalcy." He added the trend in the West is no different than any other section according to a recent national survey by the group.

Attendance at the meeting, first in the West since 1938, was expected to be about 2300 or equal to last year's Montreal turnout.

**Warehouse Squeeze . . .** Western warehouses are feeling the pressure from steel producers even more than the industry nationally because they do a larger percentage of the business. A leading California warehouseman last week said, "Nobody buys from warehouses here until they've shopped all the mills. We rejoice now when we get an order for 5 tons. Our average order size is only 40 pct of what it was in the last six months of 1953."

In addition to lower mill prices, producers (with and without warehousing outlets) are competing deliverywise, based on large mill inventories. One Southern California mill sent a truckload of steel overnight 500 mi. to Northern California to get an order. Another 30-ton order of angles for an arsenal was bid by a mill at \$35 per ton under warehouse price with immediate delivery.

Western steel producers feel



warehouses have been getting more than their share of business, generally about 26 pct compared to 20 pct nationally. Warehouse business buildup, they feel, has been due in a large degree to priority orders of warehouse customers, too many warehouses, availability when mills couldn't handle orders and mills' tendency to stick with larger customers when demand is hot.

Smaller customers attempting to crack the big league class of mill buyers now get a warm welcome from mills and are encouraged to order in carload quantities. Mill shipments to warehouses are currently off about 25 pct from a year ago although in recent weeks they have bounced back faster than the national trend.

**Top Producer . . .** Production pressure at Kaiser Steel Co. to make up output lost during the recent 8-day strike made Fontana the West's top producer for the first time last week, excepting strike years. Actual output was 29,000 tons of ingots, well ahead of the larger Geneva Works of U. S. Steel at Provo, Utah. Kaiser turned out 24,000 tons the first week following settlement of the strike May 8; 29,000 last week and this week expects to make 30,000 tons or over capacity. All nine openhearts were in production by week's end and high output is expected to continue "for several months" principally to catch up on strike losses. Kaiser's rating is 1.5 million annual ingot tons to Geneva's 1.8 million. On a company basis U. S. Steel with its Pittsburg, Calif., and Torrance, Calif., mills retained first position.

Only other area mill with comparable production percentage-wise is believed to be Oregon Steel Rolling Mills at Portland with high output of bars and structurals for Pacific Northwest dam construction and accelerated road-building.

# How to Pick the Right Cutting Oil



## WORD OF MOUTH?

It gives you the answer sometimes, but not many of your friends have the same cutting oil requirements and the same problems that you have. It's much surer to depend on specialists like Sun.



## ELABORATE SHOP TEST?

This will probably give you the answer. But it's expensive and interferes with production when you try to test all the oils available. Sun's experience can help keep your shop-testing to a minimum.

Soluble or straight, transparent or black, light or heavy duty — Sun makes the kind of cutting oil you need to handle your job at the lowest cost. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. IA-5.



## LABORATORY ANALYSIS?

Sure. But there's no formula for correlating the laboratory analysis with how well the cutting oil will work on your job. It takes years of field experience like Sun's to help you make the right choice.



## EXPERIENCE IS THE ANSWER.

And Sun has it. Its field representatives have probably come across problems similar to yours many times. If they haven't, its cutting oil specialists and metallurgical technicians are ready to help with your problem.

**INDUSTRIAL PRODUCTS DEPARTMENT  
SUN OIL COMPANY**

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Refiners of famous High-Test Blue Sunoco Gasoline



# Machine Tool High Spots

## Detroit Eyes Automation Costs

**Automakers automation plans depend strictly on cost comparisons . . . It's best answer to rising wages . . . How some firms hope to cut expense—By E. J. Egan, Jr.**

When a metalworking manufacturer gets really curious about automation he probably goes to Detroit for an on-the-spot check of automotive plants. One of the first things he learns is that Detroit's decisions to automate production operations depend strictly on cost comparisons.

Processes are continually reviewed in the light of suggested new automation techniques. The application of automation for its own sake is tempting, but stiff price tags on these integrated metalworking and metalforming systems are a sobering influence on management.

There are three completely new V-8 engine tooling programs now underway in Detroit. In all three production will be automated to a very high degree.

**Costs a Lot . . .** A good guess at the price tag on just one of these retooling projects would put the figure at upwards of \$50 million.

With these prices it isn't hard to see why basic engine designs remain in vogue for many years. Amortizing such heavy tooling investments is a long term proposition, and engine changes from year to year are confined to slight modifications.

The smaller independent carmakers face a difficult problem. If they're planning anything new in internal combustion engines, the cost of retooling is staggering and can be expected to keep on rising.

If they do retool, and the gas turbine comes into practical use within the next few years, they may not have enough time to fully depreciate their piston engine tool

costs. The big carmakers are concerned about this problem also.

**Piston vs Turbine . . .** Advocates of the piston engine are in a real battle. They'll have to come up with something spectacular to head off the gas turbine. And the turbine designers are just as determined to find a way to lick their No. 1 headache: how to get large quantities of strategic high temperature materials at low cost.

But no matter what happens, it's certain there'll be much greater use of expensive machine tools and transfer mechanisms.

With automation as expensive as it is, an outsider might wonder if it's worth it. The automakers figure it is. Despite the tremendous cash outlay it takes to retool, major car builders are always willing to take a chance.

Reason they're willing to take this gamble is because they have to find a solution to their main problem—ever-increasing wage costs. And automation provides

the answer through increased productivity.

**Must Save More . . .** But just shaving production costs by an amount equal to wage increases is not enough. The rise in wage costs must be offset by a somewhat larger saving in cost of the finished product so there will be something left to pass on to the consumers and stockholders.

Naturally automakers are anxious to cut automation costs as much as possible and some are now focusing their effort on automation design, engineering, and installment charges.

Much of the automation equipment now being used in auto plants was installed by machine tool builders. Some of it came into being through the efforts of firms specializing in these techniques. Design and consulting service charges for these integrated machine tool and transfer units add considerably to retooling costs.

To reduce these costs some automakers are trying to capture a little of this special engineering talent for themselves. Often it can be discovered or developed in their own organizations. Object is to get necessary design and planning "at cost."

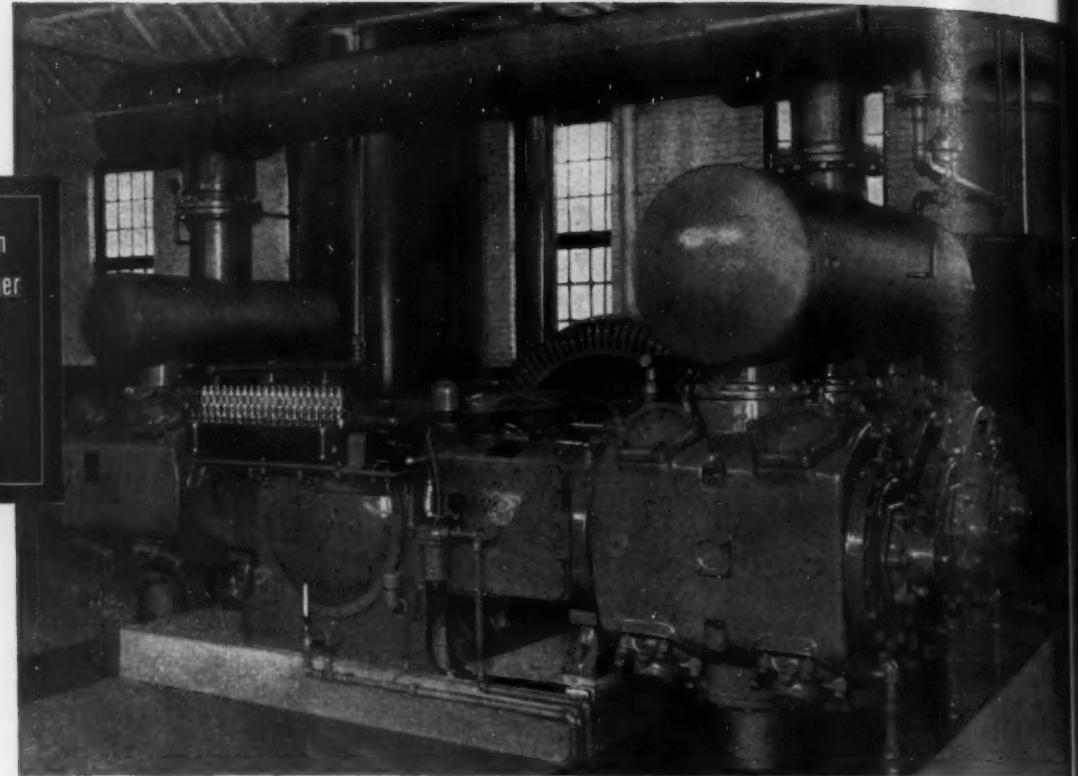
**Insiders Do Better . . .** Carmakers have a pretty good argument to back up this line of reasoning. They point out that inside talent should be much better acquainted with its own automation and retooling requirements.

If this plan works out, it means machine tool builders would get orders for only the necessary equipment.

This economy technique is already underway in some auto plants. Engineers are encouraged to submit their "wildest" schemes for new ways to form and handle metal parts. Their natural talents are being allowed the fullest possible expression.



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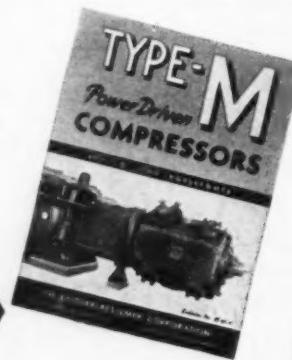


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MOUNT VERNON, OHIO — GROVE CITY, PENNA.

# The Iron Age

## SALUTES

**Lester E. Brion**

A firm advocate of team play, he helped his own firm's growth by working to organize an industry.



**A**S stroke of the University of Pennsylvania's freshman and four-man crews, Les Brion, Board Chairman of Peter A. Frasse & Co., Inc., learned what a well organized team could do, when it pulled together.

Not so many years later, Les had a chance to demonstrate how principles of coordinated team play could bring about the betterment of an industry. In the late 1920's he set out to win recognition of the warehouseman's place in the steel merchandising picture.

Serving as Chairman of American Iron, Steel & Heavy Hardware Assn.'s Cold Finished Bar Committee from 1928 to 1933, Les was a driving force in establishing mill parity on small retail quantities of cold finished bars. This gain, followed by similar parity treatment for other products, acted as a shot-in-the-arm for the steel warehouse business. Soon after industry members set up the American Steel Warehouse Assn., Les became its president (1935-6). Since then he has been a director and member of its executive committee.

With America's entry into World War II, Les lost no time in pulling his weight on the defense team. From 1942-45 he was a member of War Production Board's General Steel Warehouse Industry Advisory Committee and a director of Steel Recovery Corp.

Formerly an enthusiastic yacht racer on Long Island Sound, Les has now turned to fly fishing. He and Mrs. Brion spend part of their time in New York City, part at their Oyster Bay, N. Y., home.

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2055

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THE IRON AGE

# The Iron Age

## INTRODUCES

Earl M. Doig, elected president, HANNA FURNACE CORP., Buffalo.

Frank H. Smith, elected president, newly formed SMITH TUBE CORP., New York.

Harleston R. Wood, elected vice-president in charge of planning and development, ALAN WOOD STEEL CO., Conshohocken, Pa.

John E. McCauley, elected chairman of the board and chief executive officer, BIRDSBORO STEEL FOUNDRY & MACHINE CO.; and G. Clymer Brooke, promoted to president.

Donald C. Burnham, becomes vice-president in charge of manufacturing, WESTINGHOUSE ELECTRIC CORP., Pittsburgh. He succeeds T. I. Phillips, who is retiring.

John J. Lee, elected executive vice-president, TWIN COACH CO., Kent, Ohio.

Henry Z. Carter, appointed executive vice-president, and elected to board of directors, AVONDALE MARINE WAYS, INC., New Orleans.

Gordon D. Skinner and Carl S. Ablon, elected vice-presidents, LURIA BROTHERS & CO., INC.

Arthur T. Hunter and Fred O. Pahmeyer, elected vice-presidents, COMBUSTION ENGINEERING, INC., New York.

Elmer Schwartz, elected vice-president in charge of operations, GREAT LAKES STEEL CORP.

Christian de Guigne, elected chairman of the board, STAUFFE CHEMICAL CO., San Francisco.

Arvin H. Quam, appointed treasurer, INLAND STEEL PRODUCTS CO.

Bruce E. Ellithorpe, appointed director of advertising and public relations, AXELSON MFG. CO. division of Pressed Steel Car Co., Inc.

Henry C. Egerton, elected a director, BULLDOG ELECTRIC PRODUCTS CO., Detroit.

William F. Young, appointed sales engineer, new St. Louis sales office, DE LAVAL STEEL TURBINE CO., Trenton, N. J.

Robert M. Burford, named sales supervisor, newly created Buffalo district, Metal Processing Dept., PENNSYLVANIA SALT MFG. CO.

Raymond M. Rebert, becomes chief chemist in charge of chemical section, Research & Development Dept., NORTON CO., Worcester. He succeeds Mark O. Lamar who has retired.

Elliott M. Estes, appointed assistant chief engineer, Oldsmobile Div. in charge of body and chassis design and engineering standards, GENERAL MOTORS CORP., Lansing.

Carroll Cone, appointed chief engineer, Industrial Divisions, SURFACE COMBUSTION CORP.; and William H. Dailey, appointed chief engineer, Steel Mill Div.

Arch J. Cochrane, appointed manager, Chicago district operations, THE YOUNGSTOWN SHEET & TUBE CO., Youngstown, Ohio.

Fred Gombert, appointed Norge heat product manager, Ingersoll Products Div., BORG-WARNER CORP., Chicago.

Harry D. Curtis, appointed general manager, Rawlins Bros. Steel Div., SOLAR STEEL CORP., Calif.; Walter I. Wilson, appointed assistant manager; and Seymour Jacoby, appointed comptroller.



H. M. HECKATHORN, elected president, Mullins Manufacturing Corp., Warren, Ohio.



ROBERT G. ALLEN, named president and general manager, Pesco Products Div., Borg-Warner Corp., Chicago.



JAMES M. MEAD, elected a vice-president and director, Joseph T. Ryerson & Son, Inc., Chicago.

## Personnel

Fred W. Beitner, appointed manager of sales, Northeastern Territory, Trent Tube Co., CRUCIBLE STEEL CO. OF AMERICA, Pittsburgh; Carl H. Fisher, appointed superintendent, Tool Bit, Sanderson-Halcomb Works; and Charles E. Kirk, appointed superintendent, Cold Rolled Div., Spaulding Works, Harrison, N. J.

Donald H. McCuaig, appointed manager of application engineering, Air Conditioning & Refrigeration Div., WORTHINGTON CORP., Harrison, N. J.

R. J. Reif, appointed manager, THE R. K. LEBLOND MACHINE TOOL CO., Cincinnati.

Carroll Marquard, appointed manager of production engineering Central Metal Div., CONTINENTAL CAN CO.

George W. Stanley, Jr., appointed general manager, Solar-Sturges Mfg. Div., PRESSED STEEL CAR CO., INC., Melrose Park, Ill.

Selden E. Doughty, appointed production manager, THE CARPENTER STEEL CO., Alloy Tube Div., Union, N. J.

J. M. Hileman, named works manager, ALUMINUM CO. OF AMERICA, Richmond, Ind., Works.

Frank A. Benoit, Jr., appointed foundry and pattern shop superintendent, BROWN & SHARPE MFG. CO., Providence, R. I.

Charles S. Tennant, appointed plant manager, new engine plant #2, FORD MOTOR CO. The new plant is under construction in Brookpark Village, Cleveland.

W. J. McClure, appointed northwestern district manager, DAVEY COMPRESSOR CO.

Les Jensen, appointed eastern division sales engineer, HYSTER CO., Portland.

C. F. Meuser, appointed export sales representative, LOCKHEED AIR-CRAFT CORP. in Europe.



WILLIAM N. NOBLE, elected vice-president, in charge of the Porcelain Enamel Frit & Glaze Frit Divisions, Ferro Corp., Cleveland.



W. HARVEY THOMPSON, named assistant to the executive vice-president, H. K. Porter Co., Inc., New York.



WILLIAM H. LOWE, named treasurer, Inland Steel Co., Chicago.



OSWALD R. EGAN, elected comptroller, Inland Steel Co., Chicago.

## Cut Production Time and Costs



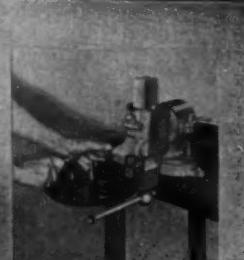
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This is another of the many reasons why "Illinois Gear" is the World's largest producer of high quality gears of every type.

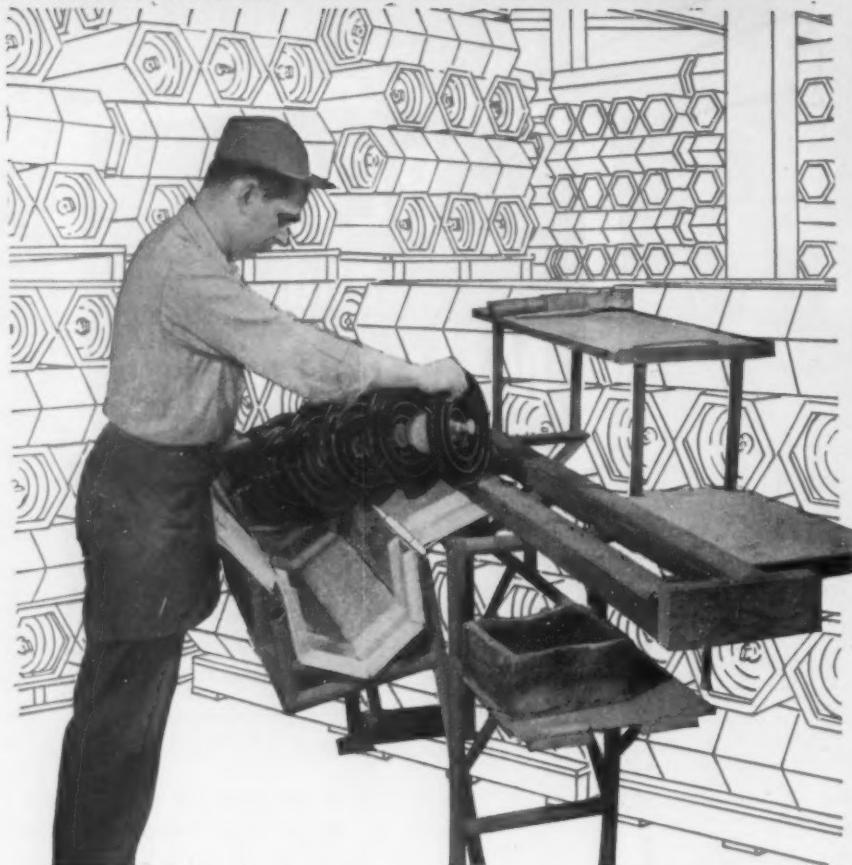
\*All of these generators cut "CONIFLEX" tooth form.

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- Wirebound Crates and Boxes

## Personnel

*Continued*

**James A. Munro**, appointed assistant manager, Structural Fabricating Div., Chicago plant, JOSEPH T. RYERSON & SON, INC.; and **Robert H. Hering**, becomes work order department manager, Detroit.

**John W. Frazier**, named field manager, of Air Filter Sales, AMERICAN AIR FILTER CO., INC., Louisville, Ky.

**Howard J. Mather**, named general manager of industrial sales, Paint Div., PITTSBURGH PLATE GLASS CO.; and **George P. Myers**, becomes industrial sales manager, Suydam Div.

**J. E. Mullen**, appointed general sales representative, PITTSBURGH GEAR CO., subsidiary of Brad Foot Gear Works, Inc.

**B. M. Kaiser**, becomes regional sales manager, Southern region, INTERNATIONAL HARVESTER CO.; **R. G. Greer**, becomes regional sales manager, Eastern region; and **J. F. Adams**, named regional sales manager, East Central region.

**George J. Ficken, Jr.**, appointed assistant general sales manager, RUSSELL, BURDSALL & WARD BOLT AND NUT CO., Port Chester, N. Y.

## OBITUARIES

**Royce G. Martin**, president and chairman of the board, The Electric Auto-Lite Co., Toledo.

**Maurice W. Gotthelf**, 63, director of public relations, AC Spark Plug Div., General Motors.

**Dr. Wendell F. Hess**, 51, director of research, Rensselaer Polytechnic Institute, Troy, N. Y.

**F. W. Wilkening**, founder and chairman of the board, Wilkening Mfg. Co., Philadelphia.

**Bjarne B. Anderson**, senior contracting manager, American Bridge Div., U. S. Steel Corp.

**M. W. Hodgdon**, manager of forging sales, Aluminum Co. of America at his home in Cleveland.

**Clarence H. Fryer**, 56, general manager, Erie Concrete & Steel Supply Co., Erie, Pa.

Saves water, too—

The Iron Age  
FOUNDED 1855  
Technical Articles

# Plating Setup Recycles Propellers for Proper Balance



By: C. B. Conwell

Supervisor  
Production Engineering Dept. Production Engineering Dept.



C. J. Stansfield

Design and Methods  
Production Engineering Dept.

Hamilton Standard  
Div. of United Aircraft Co.  
Windsor Locks, Conn.

♦ AN AUTOMATIC CONVEYOR, with one of the highest vertical lift in the world is now zinc-plating steel propeller blades at Hamilton Standard, Div. of United Aircraft Corp., Windsor Locks, Conn. Besides turning out more consistent deposits with this new return-type machine and considerably increasing productive capacity, automatic operation has speeded plating time by 30 to 50 pct.

Along with the high lift, special engineering features of the installation include: recycling of blades through the zinc-plating tank and automatic transfer of blades to and from the plating conveyor; delayed set-down of blades over certain tanks; automatic by-passing of selected tanks; hydraulically-operated elevator

♦ Several special engineering features built into new installation for zinc plating propeller blades have speeded operations 30 to 50 pct . . . More important, deposits are more consistent . . . Plating for blade balance, a relatively new use for electroplating, is done by automatic recycling as needed.

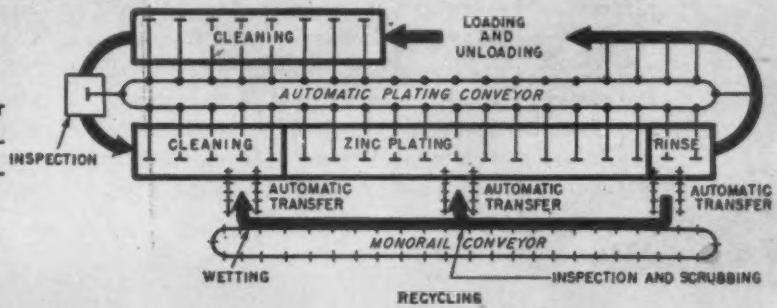
♦ The setup also features one of the highest vertical lifts on an automatic plating conveyor . . . Transfer of blades to and from conveyors, and bypassing of certain tanks, are also done automatically . . . To conserve water, all spray-rinse tanks are equipped with electric eyes.

lift; simplified solution control; system for conserving water in spray-rinse tanks; and specially designed equipment for handling the long and relatively awkward propeller blades.

Previously, propeller blades were handled manually. Many small tanks were used and platers were limited to handling only one blade at a time. The job of dipping and lifting the large blades and moving them from tank to tank was laborious and time-consuming.

During operation, blades are placed on the elevator-type plating conveyor at the loading station. Blades are then automatically carried through a series of cleaning and preparation baths, being lifted 10½ ft as they move from bath to bath. Blades may be loaded on the con-

LAYOUT of plating conveyor shows setup for recycling propeller blades to achieve proper balance. For recycling, blades are transferred automatically to a monorail conveyor.



## **Chief problems were: How to handle a bulky product, with automatic cycling, bypass tanks if desired, control solution flow . . .**

veyor at any time. Balancing or spacing of loads is unnecessary.

Cleaning is followed by immersion in a zinc-plating bath. After rinsing, blades either return to the loading station to be taken off the conveyor or they transfer to a monorail conveyor for recycling through the zinc-plating bath. The transfer mechanism is selective in that it only transfers blades specially designated for recycling.

Blades to be recycled are inspected, sanded and scrubbed down on the monorail conveyor before being returned to the plating conveyor. They may be returned at the mid-point of the zinc-plating tank for half a run through the bath, or at the end of the tank for a full recycle.

Plating is a vital step in the fabrication of hollow steel propeller blades. It is done for two reasons; mostly to protect the steel surface, and secondly to provide properly distributed weight for the fine balance required for aircraft propellers.

Plating for balance, which is a relatively new application of electroplating, is the principal reason for recycling. The thickness of deposit that effects the balance is determined before blades reach the plating installation. To put on the desired deposit, blades are recycled through the zinc bath from two to six times.

### **Elevator lift hydraulically operated**

In converting to automatic plating, problems involving equipment design, layout, engineering and operation arose. The chief problems were: how to handle a bulky product, how to provide automatic recycling, how to bypass certain tanks, how to set up controls for solution flow, how to protect the rubber fairing on the propeller blade from cleaning and plating solutions, and how to conserve water which is a problem throughout the plant.

The steel propeller blades are for use with high-powered engines. Their lengths range from about 4 to 7½ ft. The larger blades, with their holding fixtures, weigh more than 200 lb. Automatic plating necessarily requires vertical tanks, thus an uncommonly heavy and high lift.

The Hanson-Van Winkle-Munning Co., Matawan, N. J., engineered, built and supplied the plating equipment for the installation, including the generators, to fit specific requirements set up by Hamilton Standard. The key item, the plating machine, was adapted from a standard elevator-type conveyor. Unlike the standard conveyor, the elevator lift on this machine is hydraulically operated to handle the big blades.

Carrier arms have a specially designed two-pronged hook on the end. This hook supports a T-bar fixture attached to the end of raceways of the propeller blade. The T-bar fits into the carrier's two-pronged hook. The conveyor handles 12 blades at once in the main plating tank and has carrier arms for any number up to 25 blades at other stages of processing.

### **How blades are balanced**

To automatically recycle work through a plating bath, two problems had to be solved. First, how to transfer unfinished work from the plating conveyor to the recycling conveyor, and vice versa. Second, how to block transfer of finished work from the plating conveyor.

Transfer mechanisms designed for this operation are located at the middle and at each end of the zinc-plating tank. Components of the mechanism are two sprocket-driven chains about 5 ft long, and limit switches for starting and stopping the transfer. A mechanical indexing counter on the T-bar fixture controls the transfer movement.

To block transfer of a finished blade, an operator when loading an unfinished blade on the plating conveyor sets the pointer of the counter for the number of recycles desired. A lever advances the counter on each pass through the plating tank. After the proper number of passes, an arm on the counter is sprung. The arm engages the limit switch on the transfer mechanism. This prevents transfer and permits the blade to continue its course around the machine to the unloading station.

Prior to plating, propeller blades are balanced on Gisholt machines. After testing, the chief plating operator determines the number of recycles each blade should undergo to achieve proper balance. Each cycle puts on a 0.0003 to 0.0005-in. zinc plate. The average number of recycles is four. Finished blades, after being sanded and lacquered, are again tested for balance.

### **Prevents zinc oxide formation**

Before blades are put back on the conveyor for recycling through the zinc bath, and after a scrub down, they are subjected to a continuous shower bath. Plastic curtains confine the spray. Purpose of the watering is to prevent formation of zinc oxide which would adversely affect further plating.

Some blades do not require a reverse-current alkaline bath or muriatic acid dips, both of which are part of the preparation process for standard zinc plating. Such blades must bypass these operations.

Bypassing is accomplished in either of two ways. In the first, the operator raises a small flag that is attached to the counter. A limit switch at the station to be bypassed is contacted by this flag, signaling the carrier arm not to descend. In the second method, the operator may set a timing device on the control panel, adjusting the descent of the carrier arm above certain tanks. The arm will remain up during the 3-min cycle. After 3 min, the arm moves to the next station and continues normal operation.

Timers on the control panel may be adjusted to delay setting down the workpiece into any tank. This is presently done at one muriatic acid tank where it is desirable to immerse the blade for a period slightly less than 3 min.

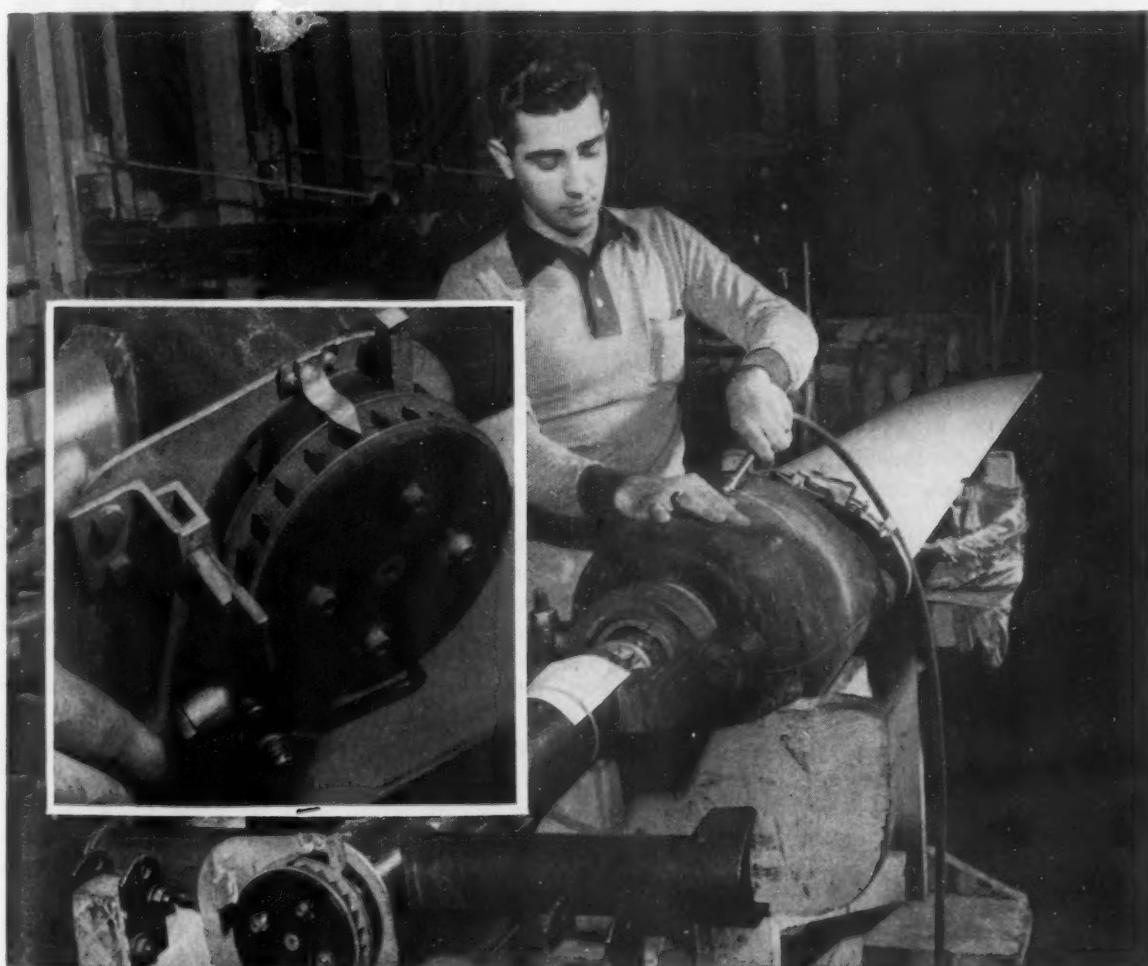
Blades travel an oval course of about 160 ft around the perimeter of the automatic plating machine. It takes a blade 135 min to make a complete cycle. This time may be increased to as much as 370 min when additional plating is required on the blade.

A motor-driven plating generator, set in a vault under the floor level, is rated at 12-v DC

and has a 10,000-amp capacity. A cleaning generator of the same type, rated at 6 v and a 3000-amp capacity, is also located in the vault.

Laying out the best possible tank and pipe arrangement involved drawing up the simplest and most foolproof instructions for controlling the complicated flow of solutions. Solutions are made up in a 2000-gal mixing tank. Each 6 months, the 10,000-gal plating tank is emptied into a 12,000-gal storage tank to permit cleaning the plating tank. Other tanks in the system are a precoat slurry tank, a filter tank, a primer tank and a 1000-gal overflow tank. Controlling the flow are 25 valves. Pipes carrying solution are lined with Saran plastic. Electric eyes and automatic shutoffs help conserve water.

A section of the propeller blade near the attached end of the propeller, called the fairing, is made of hard rubber. This section must be protected from acids, alkalies, water and plating solution. A boot was developed to be placed on top of the fairing prior to plating. Made of a flexible rubber and fitted tightly to the blade, the boot is inflated with air to 2 psi.



**PREPARING BLADE** for zinc plating involves inflating a rubber boot and setting an indexing counter. The indexing device (inset) permits re-

cycling through zinc bath a preset number of times. The rubber boot protects blade fairing from cleaning, rinsing and plating baths.

# Production Without Prototypes Cuts New Model Costs



By C. T. Blake

Executive Assistant to the Vice-President  
Engineering  
The Warner & Swasey Co.  
Cleveland

♦ ELIMINATING CONSTRUCTION of the usual expensive prototypes for two new machine tool models recently saved an estimated 6 months' production time and \$100,000 in production costs.

Normally, a prototype model of a new machine tool is built to check design theory for successful operation and performance. By-passing this experimental stage is risky business if something goes wrong, but the possible savings are well worth considering.

By careful planning and teamwork the Warner & Swasey Co. went directly from the drawing board to production assembly of a new 6-spindle bar and chucking automatic, and a new single spindle automatic chucking machine.

## Draw from past experience

Management decided these machines could be successfully built if essential precautions were observed and proper methods followed. In both cases valuable past experience served as a guide. The new 6-spindle automatic was similar in basic design to a 5-spindle machine in the line, and the single spindle unit resembled one of the firm's smaller chucking machines.

Despite these similarities, the new machines involved several hundred thousand dollars of expense in entirely new production tooling. There were problems of tolerance accumulations which presented chances for error. Also, differences in inertia forces could be expected from different masses of materials or rearrangements of parts, some of which can be too complicated for practical forecasting from the designer's board.

♦ Two new machine tool models were recently added to a major line without the usual time out for building and testing prototypes . . . Months of production time and thousands of dollars were saved . . . Customer satisfaction proved that the calculated risk paid off when performance matched design theory.

♦ Cooperation by the conference method was the key factor in by-passing prototypes . . . Theories, final designs, production tooling and assembly techniques required frequent consultation and checking . . . Previous building experience was helpful . . . Elements of proven design were not retested.

The task was successfully accomplished by complete cooperation between manufacturing and engineering groups. On the basis of this experience, the following planning steps are suggested as essential to production without prototypes: (a) engineering consultation, (b) tests of new elements, (c) departmental co-ordination, (d) design, checking and standardization, and (e) engineering follow-through.

For proper planning of design, full interchange of ideas must be provided among experienced engineering groups, outside consultants, if available, and laboratory or test personnel. Regular staff or engineering committee meetings can accomplish this result. In larger companies these may be meetings of divisional or department heads, supported by their staffs of engineers and technicians. In smaller companies, such meetings may be informal get-togethers by key engineering personnel.

It is recommended that new elements and mechanisms be tested as they are developed, but not whole machines containing both new and old elements. Simple, inexpensive samples can be tested individually or as sub-assemblies to check rigidity, life and function. For example, new type clutches, gear trains or bearing mountings will need thorough testing, but borrowed units or elements of proven design principles need not be checked repeatedly.

Following the decisions on basic design and testing of new elements, but prior to final detail drawing, departmental coordination is particularly essential. It is especially important to consult with tooling and manufacturing methods personnel at this early stage.

If design tolerances or specifications appear difficult or expensive to tool or manufacture, suggested engineering change can be incorporated prior to finalizing the design. The manufacturing superintendent or foreman should be included in these discussions to familiarize him with the project, and to get his practical advice on specific problems.

#### Check and double check

Careful and detailed checking is essential as a final step before engineering drawings are issued for tooling and production. This painstaking survey should include all dimensions and tolerances, and a second look to see that each detail of design conforms to established manufacturing standards and accepted shop practices. At this stage assembly drawings must be created, or at least layout drawings carefully reviewed, to be sure that all details finally agreed upon can be efficiently assembled.

During initial assembly of the first units, complete cooperation between the designer and the manufacturing and inspection group is essential. Despite earlier consultations and careful checking, human errors will inevitably creep into parts and sub-assemblies.

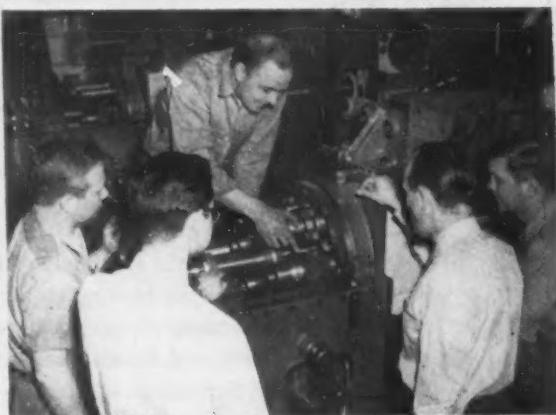
For these two new machines, Warner & Swasey assigned three key people to spend practically full time on the final assembly line. These included an engineer fully familiar with each machine, an inspection supervisor, and a laboratory technician who had previously tested special elements. They were authorized to make minor changes on the spot, formalizing drawing changes and record keeping later.

Management is convinced that close coordination of all manufacturing and engineering groups was the key factor in successful production of these two new machines. Hundreds of completely new parts were involved, many of them containing very critical dimensions.

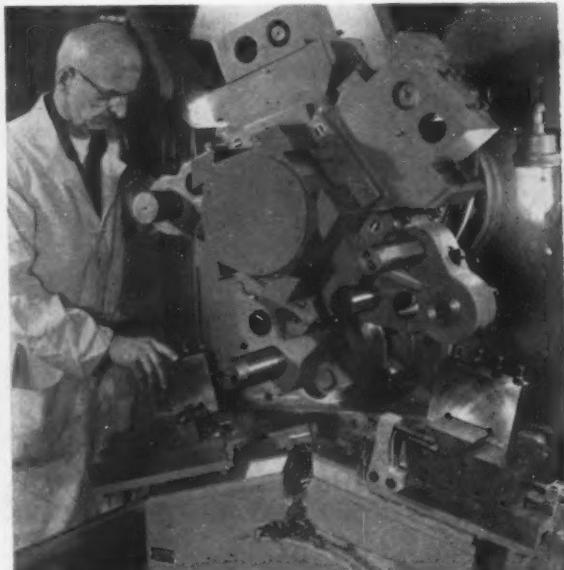
Without prototype experience, both new machines were assembled with minimum changes and alterations, inspected to previously determined standards, and shipped immediately. Customer satisfaction with machine operation was proof of the success of the methods.



FREQUENT conferences among key personnel are important in eliminating prototypes.



IN FINAL assembly, red tape was often cut to allow on-the-spot corrections of minor items.



NO TEST model preceded production line assembly of this single spindle chucking automatic.

# Molybdenum Disulfide Simplifies



By Alfred Sonntag

President  
The Alpha Corp.  
Greenwich, Conn.

- ◆ Molybdenum disulfide has proved a successful remedy for many difficult lubrication problems . . . This black mineral lubricant adheres tenaciously to metal surfaces and has proved especially useful in combating galling and seizing of oxidation resistant metals.
- ◆ Because it can resist extreme pressures, molybdenum disulfide's effectiveness is independent of the bearing metal combination and most temperatures . . . It lubricates successfully at very low and very high temperatures . . . It is chemically inert and resists most acids, an important factor where lifetime lubrication is desired.

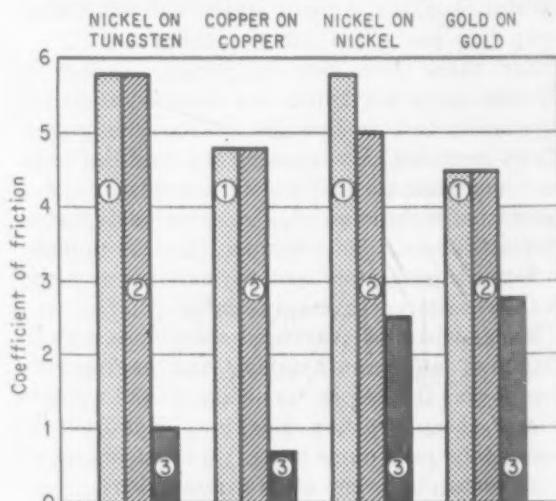
◆ MORE THAN 50 PCT of all energy produced is wasted on friction. In spite of this, lubrication is not recognized as a science in itself. To describe the phenomena of lubrication, each science—physics, chemistry, metallurgy, engineering—has its own terms and concepts. A practical condensation of the many confusing concepts is that extreme pressure or boundary lubrication without the participation of solid lubricants is practically impossible.

It is immaterial in this concept whether solid lubricants are already on the surface, or suspended solids are carried into extreme pressure areas by liquids, or solids are manufactured by extreme pressure additives in chemical reaction with the bearing surfaces. If base metals did not protect themselves with solid lubricants in the form of thin oxide films, practically all machinery would cease to run.

Natural solid oxide films substantially reduce friction, galling and welding of most metals. It is therefore logical to try to improve on nature's own defensive solids by alloying or supplementing them with more highly qualified solid lubricants.

With few exceptions, friction between oxide-free metal surfaces is exceptionally high. Weld-

ing and seizing can occur even at low bearing pressures, depending primarily on the cleanliness of the surfaces. These "clean" bearing surfaces are also produced if small surface



COEFFICIENTS OF FRICTION of unlubricated specimens with surface films removed by heating and cooling in vacuum (1), after admitting hydrogen or nitrogen (2), and after a trace of oxygen had been admitted (3).

# Extreme Pressure Lubrication Problems

ridges are sheared off or abraded and protecting oxides have insufficient time to form.

The significance of natural oxide films gives a partial answer to the galling, welding and seizing characteristic of oxidation-resistant metals. Implementation of surface oxides by other solids, in this case molybdenum disulfide, has been a successful remedy.

Lubrication by liquids is often thought of as a liquid completely separating the mating surfaces. This condition is obtainable only by hydrodynamic lubrication. Comparison of average coefficients of friction makes it evident how far most practical applications are removed from this ideal.

For full hydrodynamic lubrication, the coefficient of friction is about 0.002. When complete separation of bearing surfaces by liquids is interrupted, and solids begin to contact, the coefficient of friction moves by a factor of 50 to about 0.1.

Full hydrodynamic lubrication permits conversion of energy with an efficiency of about 99.8 pct whereas energy losses due to friction in machinery are estimated at about 50 pct. Since complete separation of surfaces by liquid

films is impossible in most applications, the best that can be expected is partial support by liquids and lubrication by solids. As bearing pressures rise or sliding speeds drop, the liquid serves as a convenient means to distribute frictional heat, and as a carrier for solids or chemicals.

In recent years, molybdenum disulfide, a black mineral similar in appearance to graphite, has gained importance in the lubrication field. It is a solid lubricant with outstanding characteristics. It is used as a dry lubricant, as an extreme-pressure additive in greases, or it may be suspended in liquids.

Molybdenum disulfide has a natural affinity for tenacious adherence to metal surfaces. The structure of a molecule of MoS<sub>2</sub> consists of a layer of molybdenum atoms with sulfur atoms on either side. Its molecular bond to metal surfaces is strong. Removal of the underlying material appears necessary if the surface is to be coated by plating.

Low-friction sliding surfaces are an integral part of a molecule of MoS<sub>2</sub>. The ease with which MoS<sub>2</sub> particles slide on each other is credited to repulsive forces between two adjacent sulfur

## INDUSTRIAL USES FOR MOYBDENUM DISULFIDE

### Extreme Bearing Pressures

Severe cold forming, including wire drawing; metal cutting where friction component is a large part of total cutting force—tapping for example; cutting of metal which does not oxidize easily or has a tendency to weld or smear.

Examples:—Toggle joints, cams, gears, threaded connections, power screws, lathe centers and steady rests, and new machinery during run-in period.

### Extreme Temperatures

Threaded connections and sliding parts on internal combustion engines; steam and gas turbines; jet engines; refrigeration machinery; aircraft; plastic molding presses; military weapons; oven chains.

### Unusual Environments

As a dry coating on lead screws and sliding surfaces of machinery for working plastics, stone or wood; machinery in cement plants; valves for solvents or chemicals.

### Mating Surfaces of Similar Materials

Chemical processing equipment; threaded connections; pumps; plug valves.

### Fretting

Wherever reciprocating motion takes place such as on spline shafts.

### High Starting Friction

Pressures at actual contact areas of two ground and lapped steel mating bearing surfaces reached yield point of steel even at very low loads. On fine machine tools, measuring machines and instruments where close tolerance and minimum backlash requirements present seizing problems, MoS<sub>2</sub> helps.

### Rubber on Metal

Natural or synthetic rubber O rings, packings, shaft seals in hydraulic equipment, cylinders, valves, and pumps.

### Lifetime Lubrication

Where operation is intermittent on equipment as washing machines, floor polishers, cameras and relays.

## "Extreme pressure properties are inherent in MoS<sub>2</sub> material . . ."

layers which weaken the sulfur-to-sulfur bond.

The functional characteristic of MoS<sub>2</sub> molecules has been compared with a stack of bread slices buttered on both sides. The bread represents the molybdenum layer and the butter the sulfur. The butter portrays the action of the sulfur in that it sticks to the surface and has low shear strength, permitting the bread slices to slide one on another.

Molybdenum disulfide resists pressures far beyond the yield point of any metal. Tests show that pressures up to 470,000 psi have been reached. Large variations in the coefficient of friction appear to be based on the quality of the MoS<sub>2</sub> coating on the specimen. The lowest values reported in five tests are traceable to the density of the MoS<sub>2</sub> layer. These values are shown in the box on p. 138.

With one exception, tests show decreasing friction with higher pressures. One theory pro-

motes the belief that increased pressure forces more MoS<sub>2</sub> into preferred orientation on the surface. An explanation is also found in the theory of molecular attraction by which increased pressure forces a closer approach of MoS<sub>2</sub> molecules, thereby increasing repulsive forces between them and lowering the resistance to shear.

Increased friction was reported in drawing tests on 0.53-pct C steel wire subjected to 16 successive reduction draws. MoS<sub>2</sub> powder was in the draw box to be picked up by the wire. Surface roughness of the lime coating on the wire permitted a liberal pickup of MoS<sub>2</sub> in the first draw. However, less and less MoS<sub>2</sub> was picked up in successive draws as the wire surface became smoother.

### Retains lubricity at 2000°F

Molybdenum disulfide is thermally stable, retaining its lubricity from -100° to 750°F in air, and up to more than 2000°F in the absence of air. Extreme-pressure lubricants relying on liquid chemical additives are made for certain metal combinations and require a minimum temperature for chemical reaction to produce by corrosion the solid lubricants of low shear strength. In most slow-speed operations, the frictional heat developed is insufficient to initiate this chemical attack.

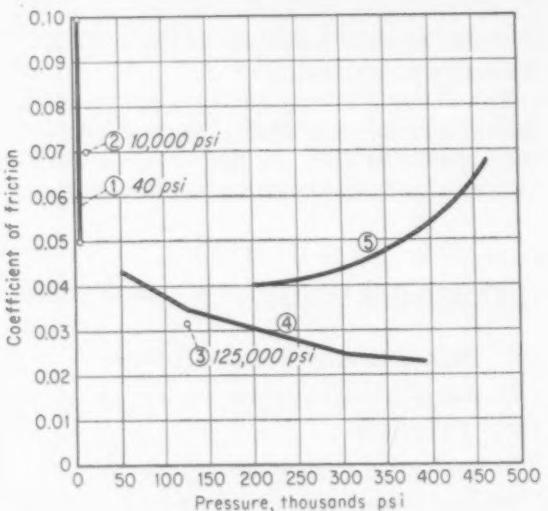
Fatty acids are excellent extreme bearing pressure agents. However, they lose their effectiveness either at the melting point of the acid or at the softening point (104° to 470°F) of the metallic soaps formed. Since their effectiveness also depends on their ability to form metallic soaps by chemical reaction with the surfaces, efficiency is affected by the type of bearing metal used.

Extreme-pressure properties of MoS<sub>2</sub> are inherent in the material itself. Therefore, its effectiveness is independent of the bearing metal combination and the temperature within its own range of thermal stability.

Chemically, molybdenum disulfide is very stable. It does not dissolve in cold or boiling water, solvents, petroleum oils or synthetic lubricants. In the presence of pure oxygen it oxidizes at room temperature. It resists attack of most acids except aqua regia, boiling concentrated hydrochloric acid, fluorine and chlorine. This degree of inertness is an important factor in applications involving chemical machinery or where lifetime lubrication is desired.

### BIBLIOGRAPHY

- (1) Static friction of various metal combinations, MoS<sub>2</sub> powder and MoS<sub>2</sub> containing liquids.
- (2) Press fit tests at 6 ipm, using MoS<sub>2</sub> on polished hardened steel mating surfaces.
- (3) Constant coefficient for velocities of 1000 to 16,000 fpm, using 18 and 50 pct MoS<sub>2</sub> by weight in silicone.
- (4) Hardened steel mating surfaces lapped to about 2 rms microinches, turning at 1/2 rpm of small diameter specimens.
- (5) Drawing 0.53-pct C lime-coated steel wire, using MoS<sub>2</sub> powder for 16 successive draws at 1.64 ft per sec.



- 1 The Friction and Lubrication of Solids, F. P. Bowden and D. Tabor, Oxford University Press, London.
- 2 Molybden Disulfid, G. Spengler, Erdol und Kohle, March 1954, Hamburg, Germany.
- 3 Properties and Uses of Pure Molybdenum Disulphide, paper by A. Sonntag presented to the American Society of Lubrication Engineers, Milwaukee, March 1953.

**Back and forth—**

# Traveling Pressure Shoe Extends Stretch Forming Uses



**Henry Hein**  
Works Manager  
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Solon, Ohio

- ♦ Stretch forming sheet and extruded lengths to make contoured parts is an accurate, economical method for many tough jobs . . . Adding a "side pressure shoe" to the basic rotating die machine permits making accurate arcs and circles from tough alloys . . . Parts retain their physical properties, aren't stretched to dangerous tensile limits.
- ♦ Latest development adds a traversing or "wiping" motion to the side pressure shoe . . . Extra travel extends equipment use beyond arc and circle forming to make a variety of irregular shapes . . . Special ram cylinder heads accommodate wide sheets or extruded shapes, can be quickly changed to meet production needs.

♦ RECENT DEVELOPMENTS in the stretch forming process have concentrated on overcoming wasteful methods of fabricating jet aircraft parts from expensive and scarce alloys.

The search for better processes led to the addition of a "side pressure shoe" to the basic rotary stretch former. By locating this shoe at the point of tangency between the workpiece and die, and applying pressure to it through a hydraulic cylinder, a high degree of forming accuracy is achieved. The side pressure shoe finds special application in the forming of full or part circle shapes in sheets, extrusions or conical sections. Accompanying photographs show the forming of guided missile fin supports with the aid of a side pressure shoe.

With this development, parts can often be formed with one-third the hydraulic ram tonnage required in the fixed die stretch forming process. This is because the motor driven table, stretch ram and side shoe compression ram work in conjunction, forming the part in small sections instead of bending it around the die as a complete unit. The finished product retains its

essential physical properties and the metal is not stretched near its tensile limit.

This Radial Draw Former has been found especially suitable by many manufacturers in



**SIDE PRESSURE** shoe doesn't move laterally, is chiefly used in forming many circular shapes.



MISCELLANEOUS dies and formed parts give an idea of versatility of stretch form methods.

the aircraft industry for the production of full rings from sheets or extrusions of aluminum, Monel, bronze and steel alloys. Materials as hard and tough as sheet Stellite have also been successfully formed by this combined stretching and wiping action. The tool has been used extensively to produce a great variety of shapes in bus, trailer, tractor, airplane, guided missile, jet engine, railroad and automobile parts.

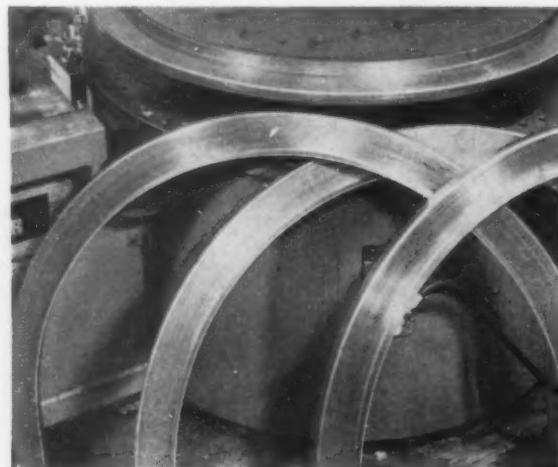
Despite its wide application to ring forming by stretch or compression methods, or a combination of the two, certain limitations became apparent in the operation of the machine with

its fixed side pressure shoe, as then in use.

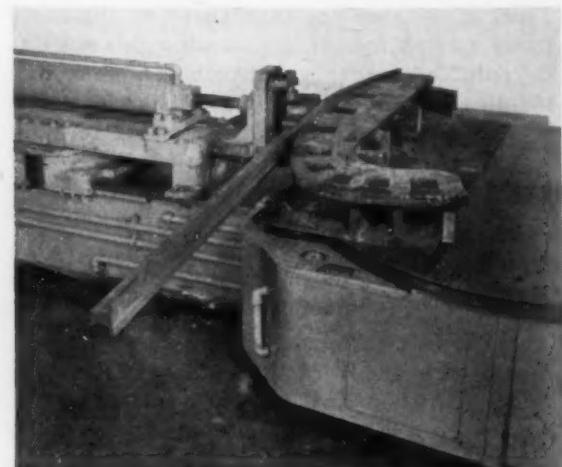
It was realized that a pressure shoe which could operate at any point on the work with a back and forth "ironing" motion, would extend application of the equipment beyond arcs and full rings to the forming of innumerable irregular shapes.

This led to introduction of the "traversing wipe shoe" and a new model precision stretch former.

Sheets and extruded parts are formed by the use of special heads attached to the ram cylinder. Sheet heads are available in a variety of



GUIDED missile fin supports are accurately formed with the aid of side pressure shoe (left).



STEEL wrap-around dies allow volume production of parts from extruded lengths of hard alloys.

sizes and tonnages to handle wide sheets and cross-sections not exceeding jaw width.

Design of these heads will vary depending on the size of the sheet, the metal and its condition, and the shape of the part to be formed. Multiple hydraulic cylinders in the jaws actuate the gripper inserts for a strong, positive grip over the full width of the material. An uneven grip on the sheet would cause wrinkling.

Extrusion heads are also hydraulically operated for fast gripping and releasing. Collet type jaw inserts are easily and economically made to accommodate varying cross-sections in extrusions and rolled or brake formed sections. Design of the head permits fast jaw changing.

Die construction for stretch forming equipment falls into three main classifications: (a) single or multiple plate dies, (b) cast dies, and (c) wrap-around dies.

Single or multiple plate dies of steel, Kirksite, Pregwood, Masonite, Rezonal, aluminum, etc., are used for all part contours which lie in one plane and are to be formed to angles less than 360°. Die material is determined by the number of parts to be formed and the method to be used.

#### Steel dies for hard alloys

Cast dies are used for stretch-forming part contours which do not lie in one plane. They are usually made of Kirksite, Dural, or plastic.

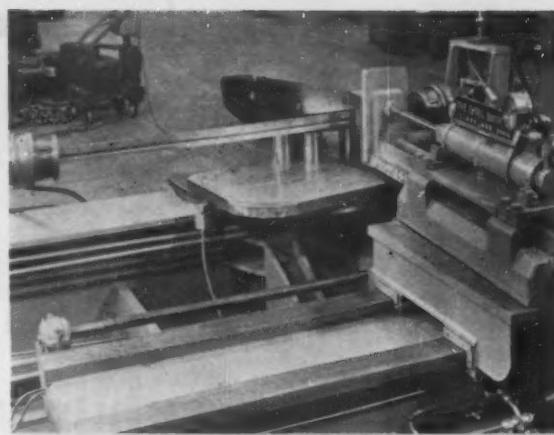
Steel wrap-around dies are used for volume production of hard alloy parts which would wear out the softer die materials. A steel bar a few inches longer than the production part is first planed to the required cross-section. A support plate is flame cut to the part curvature and built up as a weldment on its own die base mounting.

Holes burned out of this support plate allow bolts to pass through into the rear of the die bar. The die bar is secured to one end of the support plate and wrapped around its contour by compression action of the hydraulic ram as the table rotates. By this arrangement, the machine functions as its own die fabricator.

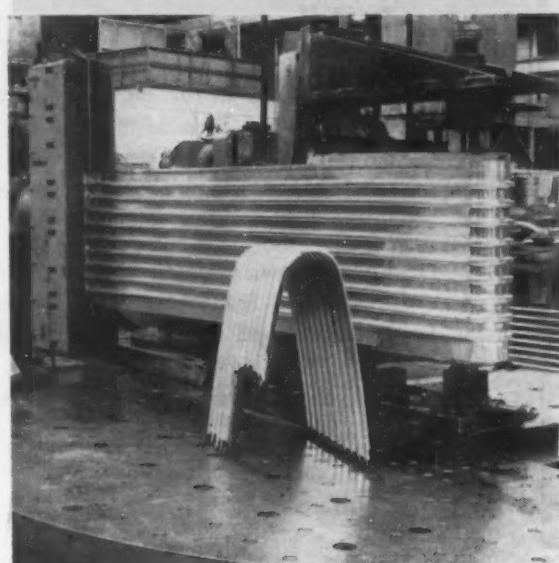
#### Form jet engine rings

A spiral form of the wrap-around die is used for making rings. This provides a slight overlap of the metal ends which are then sheared and butt-welded. This method is used to form jet engine rings from stainless steel bars.

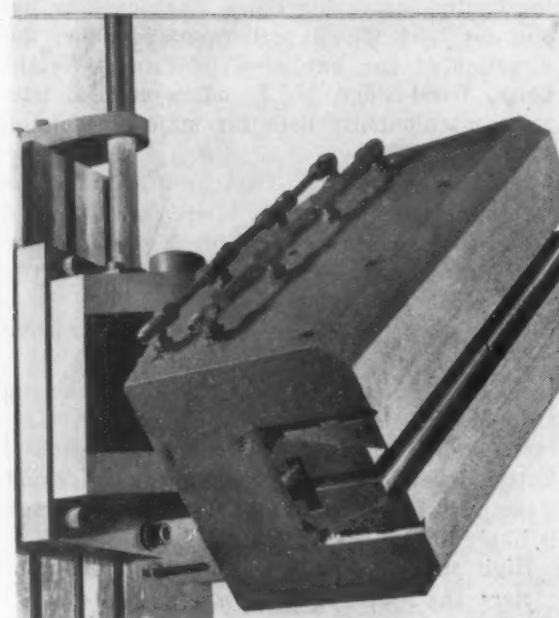
In many cases parts are formed to required tolerances in one operation with such hard metals as 75S aluminum in the "SW" condition. When these parts must first be performed in the softer "O" condition, a heat treat and final re-stretch will follow. A special re-stretch accessory consists of a short stroke cylinder with the same stretch capacity as the main cylinder. It is mounted on the machine table and used in conjunction with the main cylinder during this final stretching operation.



TRAVELING shoe (foreground) applies pressure at point of tangency between work and die.



CORRUGATED sheets are contour formed to the proper leading edge taper for aircraft use.



SPECIAL head attaches to ram cylinder, has wide jaws for positive grip on sheet stock.

# Titanium: Air Force Machinability Report

## Part II

- ♦ Here's help in routing, drilling, tapping and sawing titanium in your plant . . . Because the titanium alloys are stronger and harder than aluminum, fewer sheets can be routed at one time . . . Large relief and clearance angles on cutters help reduce welding of chips to the cutting edge.
- ♦ Chip flow, clogging and point smearing are chief problems in drilling . . . Breakage can be minimized by using shortest possible drills with rigid support . . . A double angle point helps avoid drill corner breakdown . . . In tapping, use largest possible tap drill, spiral points, interrupted flutes . . . Design for fewest possible threads.

♦ TITANIUM can be successfully routed, drilled and tapped using tools designed for the job and correct feeds and speeds, according to the United States Air Force Machinability Report for 1954. The report, prepared under the direction of and published by Curtiss-Wright Corp., Wood-Ridge, N. J., offers detailed titanium machinability data for major machining processes.

Stacked sheets of Ti-100A or RC-130A up to a total thickness of about  $\frac{1}{4}$ -in. can be routed with limited success. Titanium is much harder and stronger than aluminum alloys and the same routing procedures cannot be used. Slender cutters deflect so much that the customary thick stacks of sheet cannot be handled.

Tool failure, as in milling, is hastened by the tendency of chips to adhere to the tool. Generous relief angles minimize this tendency. Cutter deflection changes tool geometry. Rapid wear by rubbing and galling on the tool flank is likely to precede tool breakage.

High speed steel single and two-flute  $\frac{3}{8}$ -in. cutters, the former without a helix or "spiral," the latter both straight and with a  $15^\circ$  helix angle, were used. Axial and radial rakes were zero in all cases. Primary relief,  $3^\circ$  at first,

was increased to  $12^\circ$  and then to  $180^\circ$ . Secondary clearance was correspondingly increased to  $18^\circ$  and  $30^\circ$ .

Welding of chips to the cutting edge was the major problem. Large relief and clearance angles reduce this tendency. At high feeds, particularly when there is insufficient clearance, the welded-on chips are transferred to and become welded on to the finished surface of the opposite side of the slot.

Ti-100A and RC-130A sheets  $\frac{1}{16}$ -in. thick were first used. These had a hardness of 14 RC. An individual sheet could be routed fairly well. For the tests, two sheets ( $\frac{1}{8}$ -in. total thickness) and four sheets ( $\frac{1}{4}$ -in.) were used. Later, 0.072 and 0.162-in. RC-130A stock was routed. Soluble oil in 4 pct concentration was used for the earlier tests. Later, a chemically active fluid supplied with compressed air as a vapor mist was used with some improvement in performance.

With a  $\frac{3}{8}$ -in., two-flute router sheet stacked to about  $\frac{1}{4}$ -in. total thickness can be routed at 150 to 250 fpm, 1500 to 2500 rpm, and about 5 to 10 ipm table feed. Relief angles should be generous. Rigidity of spindle, cutter and work is essential. Cutter overhang should be as

short as possible to minimize router deflection.

Chip flow, clogging, and point smearing are the major problems in drilling titanium. Breakage can be minimized by using the shortest possible drills and a drill jig. Design holes as shallow as possible. A lubricating and chemically active fluid is important on small drills. A coolant is more important with  $\frac{1}{4}$ -in. and larger drills.

Titanium can be drilled with high speed steel drills. Blunt points,  $140^\circ$ , are superior on small sizes. On drills  $\frac{1}{4}$  in. and larger,  $90^\circ$  or a double angle are best. Drill angles on new drills should be checked for angle. Regrind points on a drill grinder and recheck point angle, clearance angle and web thickness carefully. Be consistent in drill geometry. General speed and feed recommendations: 30 to 50 fpm for alloy titanium of 300 to 350 Bhn with low carbon content. Feeds of 0.003 to 0.007 ipr are satisfactory, increasing with increasing diameter. For  $\frac{1}{4}$ -in. drills, use speeds between 450 and 750 rpm.

#### Shorter drills avoid breakage

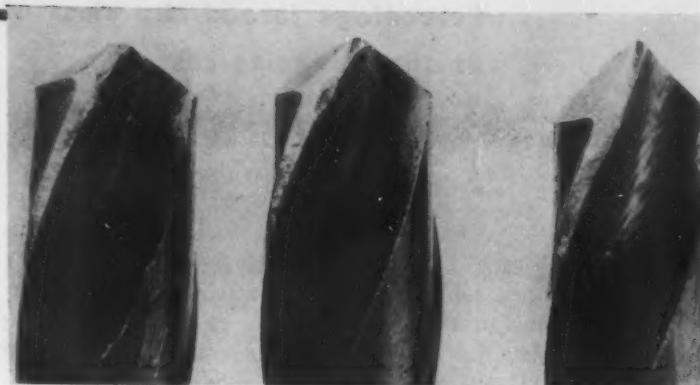
Drills should be supported as rigidly as possible. When stub-type screw machine drills could not be obtained in desired sizes, the longer drills were either broken off short and reground or were encased in a snug fitting sleeve, leaving only enough projection for the required depth of hole. This eliminated most drill breakage.

Depth of hole drilled is an important factor in drill life. A freshly-ground drill will produce good chips and no drilling difficulty will be apparent. As the drill dulls and chips flow with increasing difficulty and some titanium remains stuck to the drill lips and margins. Soon the chips become packed and wedged in the flutes and the drill will fail either by overheating or by seizing in the hole.

If holes greater than five diameters must be drilled, the drill should be retracted at intervals to clear the hole and flutes of chips. At a depth to diameter ratio of 5 to 1 or greater, drill life may be reduced to 30 pct of that obtained at depth to diameter ratios of 3 to 1 or less.

All the drills initially had  $118^\circ$  point angles, about  $29^\circ$  helix angles and  $9^\circ$  to  $11^\circ$  clearance angles. The clearance angles were maintained at  $9^\circ$  to  $11^\circ$  regardless of point angle.

A double-angle point, a blunt  $140^\circ$  point with the lip corners chamfered off to an included angle of  $90^\circ$  was tried. Breakdowns had been



QUARTER-INCH DRILLS with  $140^\circ$ ,  $118^\circ$  and  $90^\circ$  point angles after drilling titanium. Note chipping at the corner, smearing at the chisel edge and on the margins of the several drills.

occurring at this point and it was thought the chamfer would thin the chip and distribute the load over a greater area. From the limited testing done, the double angle seemed a decided improvement.

A split, or crankshaft point showed no advantages in a short trial on one of the smallest sizes but might prove beneficial with larger drills. Polished and unpolished drill flutes showed no difference in performance in the limited comparisons made. Web thinning at the chisel edge did not seem to make an appreciable difference.

With No. 36 drills, 0.004 ipr would be considered a heavy feed. With this feed,  $140^\circ$  point angle seems best. At lighter feeds, however, a  $90^\circ$  point angle is superior. With the  $\frac{1}{4}$ -in. drill, the  $90^\circ$  point angle was superior at all feeds, but the superiority was greatest at the extremely heavy feeds. A feed range of 0.002 to .005 ipr is suggested for drills smaller than



SEEN FROM ABOVE, chipping and smearing of the same drills is emphasized. Drills should be supported rigidly. Drill hole depth affects drill life. A feed range of 0.002 to 0.005 ipr is suggested for drills smaller than  $\frac{1}{4}$  in. Feeds for larger drills: 0.005 to 0.009 ipr. Special grinding gives added drill life.

## Percentage thread and class of fit affect tapping costs . . .

1/4-in. diam and 0.005 to 0.009 ipr for larger drills.

A continuous heavy feed should be used. Major troubles with titanium, stem from the smearing, galling and abrasiveness and the high temperatures. When the drill becomes dull or smeared, it refuses to cut, heat generation due to friction rises rapidly and failure follows almost immediately. The drill is no longer able to penetrate (because of work hardening and dulling) so the rubbing friction overheats the drill and it fails. The most important recommendation of all in drilling titanium, then, is to watch wear and smearing carefully and not attempt to drill with a worn or dull tool.

Titanium alloys present a severe tapping problem. Tapping is governed by tolerances to a greater extent than most machining. At the same time, these tolerances, the percentage depth of thread in particular, have a tremendous influence on the cost of tapping and tap life.

### Percentage thread vs. costs

A slight relaxation of tolerances is likely to mean great savings in tapping. Percentage thread, which is independent of the class of fit, is established by the tap drill used. Seventy-five percent thread is considered standard practice, but it has been suggested that 50 pct thread may be adequately strong in many cases. Rarely is a thread depth greater than 65 pct necessary. In the smaller sizes, the strength of the screw becomes the limiting factor and failure will occur across the root section and not by stripping. Also, the deeper the threaded hole (the more threads in engagement) the lower the percentage of thread can be.

Class of fit, which depends on pitch diameter, should also be considered carefully. This is particularly important in tapping titanium for

there is a strong tendency toward smearing on the lands of the tap. Metal on the tap lands results in oversized tapped holes and the desired class of fit will not be maintained.

By far the largest amount of testing was done on the 1/4-20 size taps. Over 60 tests were made with a total of over 2000 holes tapped. Tests usually ended in tap breakage. At other times, tests were stopped because of oversize threads due to smeared metal on the lands of the tap. In a few instances, tests had to be stopped to conserve material only because tap wear was too slight at the slow cutting speeds selected.

Only through holes were attempted in this work. Blind hole tapping of titanium is more difficult because the chips cannot be pushed ahead of the tap unless the hole is drilled considerably deeper than the required length of thread.

### Several tap styles used

Several styles of taps were used. Additional relief on the two-flute, 1/4-20 plug tap was obtained by grinding a groove parallel to the axis through the crests of the threads. Con-eccentric grinding gave additional relief on another tap. Use of a spiral point helped to drive chips ahead of the tap and minimize clogging. Taps with interrupted thread, every other tooth removed, and taps with trailing edges ground away sharply were tried to reduce the area of contact.

A highly active cutting fluid tends to make the chips flow more readily, and to reduce the smearing on the thread crests. Carbon tetrachloride was one of the most successful fluids tried. With carbon tetrachloride over 200 holes were successfully tapped at 39 fpm in Ti-150A at 302 Bhn. The wear-land on the two-flute, spiral-pointed tap was only 0.004 in. and the test was stopped to conserve material and through no failure of the tap.

The toxic nature of carbon tetrachloride rules it out as a practical fluid; it was used only to determine whether a highly-active chlorinated compound would be beneficial in tapping. Successful results were obtained using Cut-Max Z-69 and Tapeze X-2 commercial fluids. The water-base emulsions did not appear to be as effective as the cutting oils.

Plug taps in all three sizes, 8-32, 1/4-20 and 3/8-16, were unsatisfactory. No more than half a dozen holes could be tapped, regardless of



AXIAL GROOVES in 2-flute tap, left, assure centering. Chamfering trailing edge, center, gives greater chip clearance. Con-eccentric relief, right, has only forward third of land concentric.

Thread	Tap Drill	Pct Thread
8-32	28	58
1/4-20	4	63
1/4-20	6	70
1/4-20	7	77
3/8-16	P	64
3/8-16	5/16	77

fluid, cutting speed or method of obtaining additional relief. A spiral-pointed tap must be used in order to get appreciable tap life. With a spiral-point, however, additional relief or an interrupted thread design proved an added gain.

A series of paired tests were made using No. 4 and No. 7 drills, giving 65 and 77 pct thread. The 65 pct thread in every case gave longer tap life. With Ti-150A 166 holes of 65 pct thread were tapped at 53 fpm while 12 was the best that could be achieved at 77 pct thread.

All commercial titanium alloys except those containing high carbon can be hacksawed with reasonable speed and efficiency. Cutting rates are 25 to 50 pct slower than for quenched and tempered alloy steels of equivalent hardness. Blade life in terms of productivity is at least 50 pct lower.

#### Use these speeds and feeds

Average rate of cutting for stock from 2 to 3½-in. square or round in the 275 to 350 Bhn range is 1¼ sq in. per min with about 3 sq in. per min as maximum. This will yield a blade life of about 120-sq in. cut using 0.050-in. run-out as the limiting factor. At a 5½-in. stroke, the cutting speed should range between 45 and 75 strokes per min.

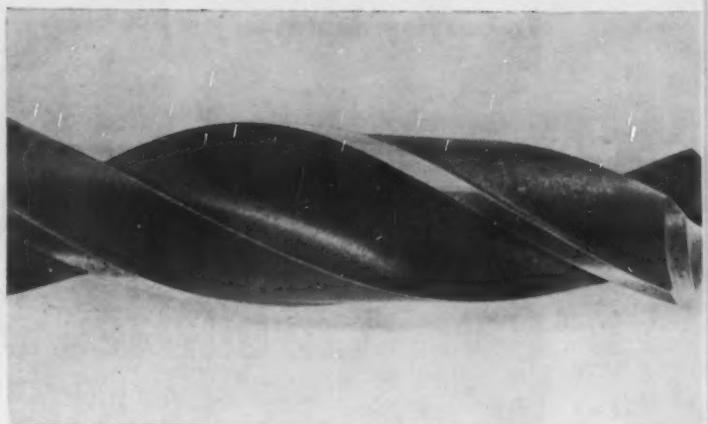
A positive 0.006 to 0.009-in. feed per stroke should be used, depending on metal hardness and to some extent on the size of the piece. Penetration (effective feed) is 80 to 95 pct of the set feed for softer alloys but it may drop to less than 50 pct for the harder titanium alloys.

#### Requires rigid, heavy duty machines

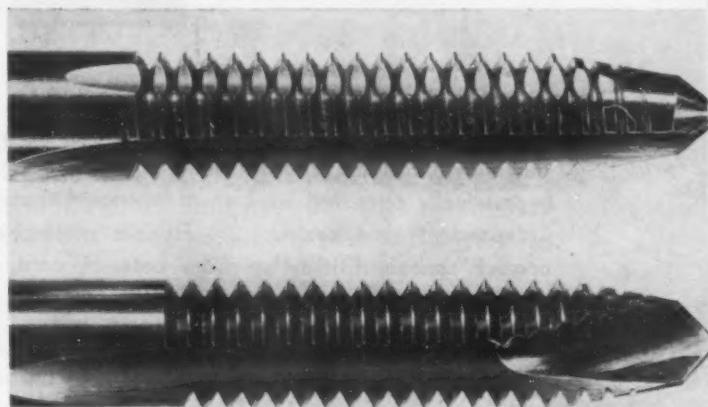
The sawing machine should be heavy-duty, adequately powered, structurally rigid and free of vibrations. It should carry a positive feeding mechanism and be equipped with a coolant system. Work must be held securely. Blade tension should be high. A torque wrench was used to tighten all blades uniformly. In this test, 45 ft-lb was applied to the standard blade-holder nut of the machine used, giving about 4500 lb tension.

To prolong blade life ease the blade into the cut by holding back the feed until well started. Use fairly coarse-pitched high speed steel blades, 6 to 4 teeth per in. for alloys in the 275 to 350 Bhn range. Sulfurized-chlorinated oils are recommended for general-purpose titanium sawing. Use a positive feed and keep friction or gravity feed fairly light. Select sawing speed according to hardness of the titanium. Avoid sawing casting or forging skins. Pickle, snag, sand blast or scarf them off first.

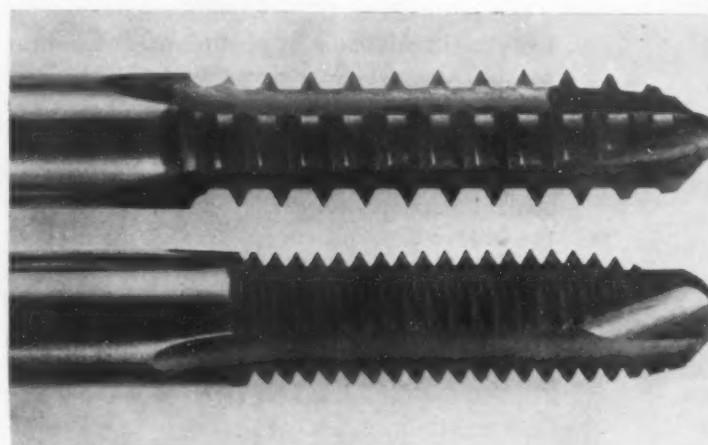
Several variations of tooth contour and set were tried. No marked difference in performance was noted, whether blades were alternate set, raker set, or had alternate teeth removed.



DOUBLE-ANGLE point grind, a standard 140° point angle with the lips chamfered to an included angle of 90° improved drill life 25 pct.



CHIP-DRIVING SPIRAL POINTS are essential in tapping titanium. The two-flute plug tap, top, was unsuccessful despite the extra relief ground in the thread crests for the tapping tests.



TWO ADDITIONAL WAYS to decrease rubbing contact are shown on the 3/8-16 taps. One, top, is made with alternate teeth missing; the other has a large specially ground secondary clearance.

To varying depths—

# Continuous Heat Treat Setup Carburizes Precision Parts



By C. A. Payntor  
Chief Metallurgist  
Aircraft Gear Div.  
Dana Corp.  
Fort Wayne, Ind.

- ♦ Automatic, pusher-type, controlled atmosphere gas furnaces simultaneously carburize aircraft gears to varying depths . . . Three hydraulically operated work rows in each furnace can be set for independent time cycles . . . Flexible atmosphere control gives correct carbon distribution from case to core, eliminates sharp gradients.
- ♦ Rotary hearth furnaces reheat parts for die or direct oil quenching . . . Controlled atmospheres balance case carbon concentration, protect part surfaces from scaling, sooting or decarburization . . . Hardened gears travel by conveyor to an integrated wash tank and a final draw furnace.

♦ CARBURIZING AND HARDENING of precision gears to close tolerances at the rate of a ton per hour requires flexible automatic controls and a minimum of manual parts handling at the Aircraft Gear Div., Dana Corp., Fort Wayne, Ind.

Two continuous pusher-type, gas-fired controlled atmosphere furnaces provide flexible control of automatic carburizing cycles. Three gas-fired rotary hearth controlled atmosphere furnaces reheat carburized parts prior to die or direct quenching. Conveyors move work-pieces between heat treating operations.

Aircraft gear and component specifications demand the utmost precision in machining and heat treating. Each part must be metallurgically accurate on the first heat treatment as reprocessing is normally not allowed.

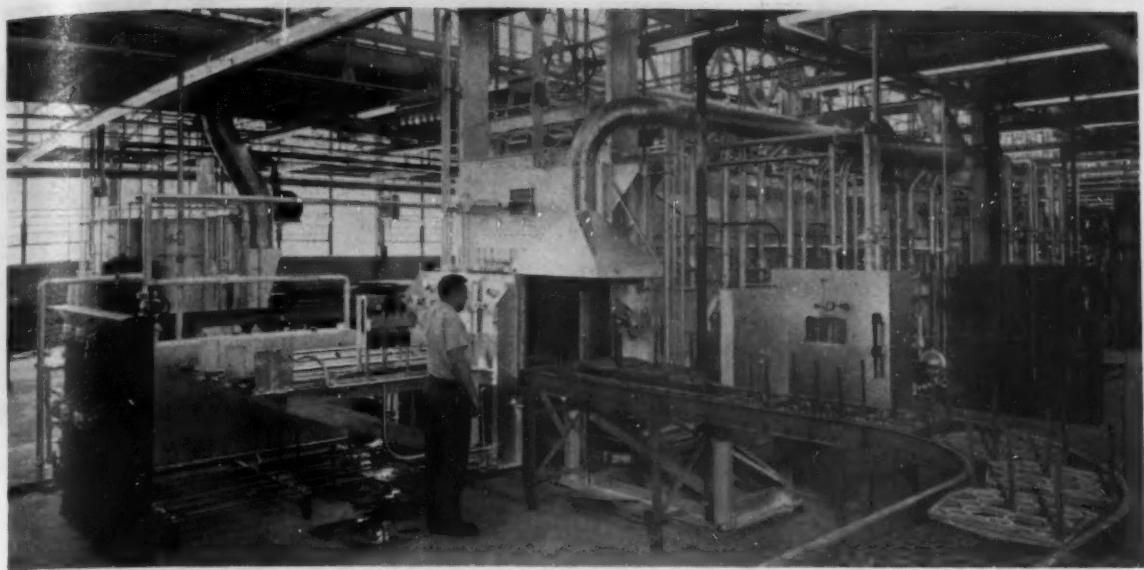
At the Dana plant, gears are machined from normalized low carbon alloy steel. A high nickel content, as found in the AMS 6260 and

6263 grades, provides deep hardening characteristics and uniform core structures.

Accurate case carburizing is the first step in heat treating parts to the high strength-weight ratios required. Two Surface Combustion pusher-tray furnaces with gas-fired radiant tubes maintain close tolerances at high production rates.

Each furnace has three work rows with U-shaped radiant tube elements over and under each row. Work rows are independently controlled and operated by hydraulic pusher cylinders of constant stroke length, easily adjusted to any time interval required.

Each furnace also has a combination charge car and door, inner charge door, stripper, push-out mechanism, inner discharge door, and a discharge vestibule door. The charge car is controlled by a push button and the discharge vestibule door by a foot switch. All other motions are automatically controlled by the cycle.



CHARGE END of pusher gas carburizer receives parts trays from a washer and dryer not shown.

These three-row gas carburizers offer several choices of automatic cycles for varying case depth according to production requirements. The basic variations are: (1) The same case depth on all three rows of work; (2) a different case depth on each row; (3) The same depth on any two rows; a different depth on the third row.

Three ranges of case depth are produced with a surface concentration of 0.90 to 1.00 pct C: (1) 0.020 to 0.030 in., (2) 0.030 to 0.040 in., and (3) 0.055 to 0.065 in.

Capacity of each furnace is based on a gross production of 1036 lb per hr. The base cycle involves heating the cold work to 1650°F, holding at this temperature for proper case and concentration, and then cooling the charge to 800°F. Charge to discharge time for an average tray load of parts is about 12.5 hr.

Furnaces are divided into five zones for carburizing, diffusion and controlled cooling. Zone temperatures are: Zone 1, 1550°F; Zone 2, 1650°F; Zone 3, 1625°F; Zone 4, 1300°F; Zone 5, 800°F.

#### Controls Carbon Potential

RX (endothermic) gas from a battery of generators is enriched with natural gas in Zone 2 and used straight in Zones 3, 4 and 5. A dewpoint of 30°F is maintained at the generator while the furnace atmosphere dewpoint is controlled at 23°F in Zone 2 and 28°F in Zone 3.

A split manifold arrangement for gas supply provides proper carbon potential for desired surface concentration. The mixture of endothermic and natural gas is introduced through an individual header and four inlets in Zone 2.

Another header introduces straight endothermic gas to the diffusion zones. This pro-

vides a lower carbon potential equal to the final surface carbon content desired. Work is held in the diffusion area until case depth and carbon distribution from surface to core is correct. This eliminates the detrimental sharp gradient often produced by carburizing in an atmosphere of uniform high potential.

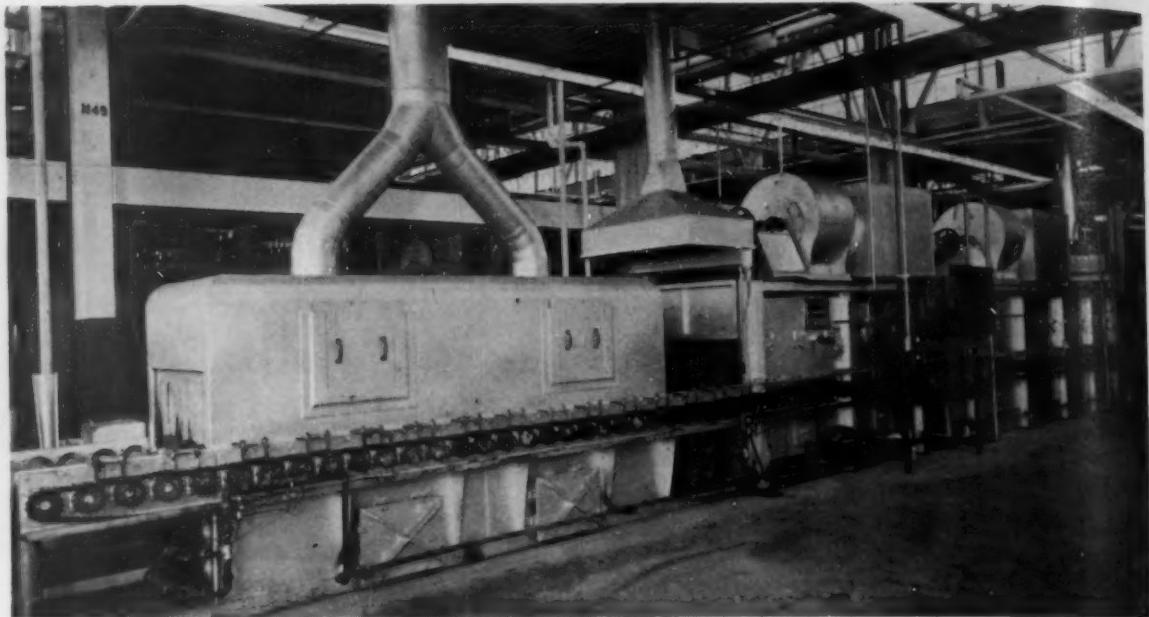
Substantially all atmosphere gas introduced into the furnace flows toward the charge end. An arch separating the carburizing and diffusion areas assists in isolating the two atmospheres and prevents atmosphere flow into the cooling zones.

To circulate the atmosphere gases, Zones 2 and 3 have heat resisting alloy roof fans with water-cooled bearing assemblies. Controlled cooling is done in Zone 5 by pulling air through the heating elements with an exhaust fan. The fan is connected to the radiant tubes by a steel pipe manifold arrangement.

To maintain close control over the carbon



ROTARY hearth furnaces reheat parts. Quench facilities are within easy reach of operator.



WASHER (foreground) and draw furnace receive hardened gears from a power-gravity conveyor.

potential of the furnace gases, carbon concentration bars are run regularly. To check case depth, a test pin is pushed through the furnace every two hours and adjacent work is assigned heat treat numbers keyed to that pin. Additional test pins are run periodically to check potential Rockwell hardness.

After cooling to proper discharge temperature, the trays are pulled onto a return conveyor. Here they are moved, by means of an air cylinder and pusher arrangement, to the unloading point. At this point, uncarburized parts are identified by code, loaded onto the empty trays, and conveyed through a wash rinse and dried before entering the furnace.

Practically all production parts have some areas copper plated to a thickness of 0.0006 to 0.0012 in. to stop off carburizing action. After carburizing, the copper is stripped before parts are reheated for hardening, except where the plated areas do not contact the quench dies. In the latter instance, parts go directly to a rotary hardening furnace where the atmosphere is balanced with case carbon content.

Other parts are given a "flash" copper plate from 0.0003 to 0.0006 in. thick before hardening. When recessed core areas prove hard to plate, a copper "stop off" paint is used.

Where intermediate machining is required after carburizing, parts are stress-relieved in a rotary hearth furnace at about 1290°F. An exothermic atmosphere protects part surfaces. This treatment generally reduces case hardness from 45 to 50 RC to 25 to 30 RC.

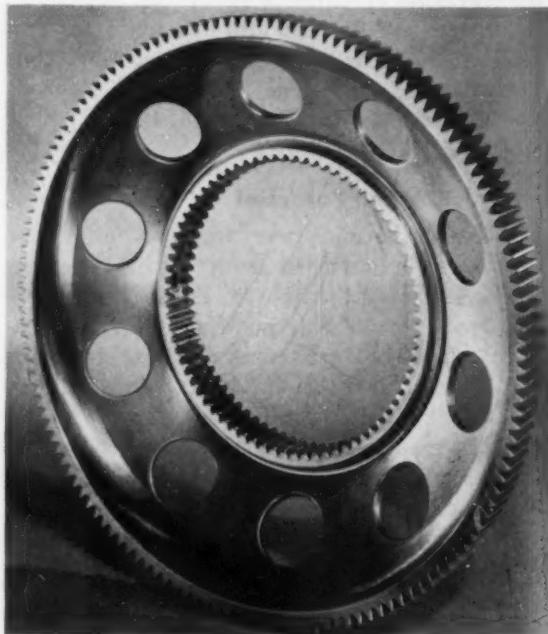
Three Surface Combustion radiant tube rotary hearth furnaces reheat carburized parts for hardening. Prepared gas atmospheres protect part surfaces from scaling, sooting or decarburization.

An operator places parts on trays and pushes them onto the rotating hearth through a foot-operated door. Hardening temperature is 1500°F. A tray of parts takes 80 to 90 min to complete its arc of travel. The slow heating cycle minimizes distortion.

Approximately 85 pct of the parts are die-quenched on Gleason presses. The remainder are direct-quenched in oil in a special batch tank with an elevator arrangement.

After quenching, parts travel by wire conveyor baskets and gravity feed to a washer and a subsequent draw at 300°F. A light mechanical blast cleaning and copper plate stripping follows the drawing operation.

**SPECIFICATIONS** for this reduction drive gear require close adherence to aircraft tolerances.



**LONG-TIME PLANNING at**

*Newport Steel*



It takes long experience, engineering skill and careful planning to operate modern steel facilities such as this reversing hot mill that converts ingot into coil in six minutes. Other long-time planning includes Newport's irrevocable policy of considering regular customers an integral part of this business, with first claim upon its capacity in good times and bad. Newport makes steel to your exact specifications and ships it by rail, water or truck from the heart of the fastest growing industrial area in America. Let's discuss your requirements and our facilities, and match them for our mutual benefit.

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- Electric Weld Line Pipe
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- Hot-Rolled Pickled Sheets
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- Roofing and Siding
- Eave Trough and Conductor Pipe
- Culverts



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## INDUSTRIAL CUT GEARS

LARGE OR SMALL  
HEAT TREATED OR  
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SIMONDS has over 60 years' experience in cutting quality industrial gears. We can supply any type of gear in

cast or forged steel, gray iron, bronze, Meehanite, rawhide or bakelite in a full range of sizes adaptable to the material. Also heat-treated, case or flame hardened gears of carbon or alloy steel. Send us your requirements for quotation.

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SIMONDS' facilities can produce any type of custom gear from your blanks if you prefer. Same quality . . . same prompt service.



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## FREE

# Technical Literature

### Sheet metal

Prices and technical data are now available from company on Pullmax Trimmer, Model P-5 and D-3. Machine operates by means of a reciprocating upper tool and a stationary lower tool that leaves an edge that requires no further finishing. It can be used for straight, circular or irregular cutting, as well as beading, folding or joggling, dishing, and louvering with only a change of working tools. Pullmax machines will work mild and stainless steel, as well as all types of nonferrous metals, plastic sheets, and expanded metal. Nine different models of machines are featured in Pullmax line for working all sizes and gages of sheet metal. *American Pullmax Co., Inc.*

For free copy circle No. 1 on postcard, p. 157.

### Plant facilities

Brochure entitled *Presenting an Element That Underlies All Other Elements In Forging* illustrates Champion's four forging shops which are under one roof. Forging tools, including hammers with falling weights from 12,000 to 36,000 lb are shown. Other drop hammers, such as board drop and steam, range from 1,000 lb and 1,500 lb respectively are included. Book reveals Champion's inside workings including magnaflux inspection, macro and micro-scopy etch tests and hot inspection. Modern die making equipment, heat treating and cleaning are seen. *Champion Forge Co.*

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### Transfer machines

New automatic production line of four transfer machines has been designed

**LEWIS**  
**TRAVEL-CUT**  
automatic, high-speed  
heavy-duty  
**WIRE STRAIGHTENING**  
and  
**CUTTING MACHINES**  
Sizes for .012" to  $\frac{1}{4}$ " WIRE  
ROUNDS & SHAPES  
**THE LEWIS MACHINE CO.**  
3450 E. 76 ST., CLEVELAND, O.

### FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 157.

and built by Greenlee Bros. & Co. for machining automotive transmission cases. All four machines combine the facilities of 247 tools to complete 265 operations in 29.5 seconds, averaging 122 cases per hour at 100 pct efficiency. Outstanding features of these machines are the safety devices for the protection of the operating personnel and the machine. Steel mesh guards are provided on and between each working station and are hinged to allow easy access to the transmission cases for inspection and removal. *Greenlee Bros. & Co.*

For free copy circle No. 3 on postcard, p. 157.

### Annealing

Brochure is now available on new plant which houses Lithium atmosphere bright annealing furnaces. Used partly for company's own production of strip, spare capacity enables company to serve the public on defense work and other uses. Large pieces including weldments, castings, bar, tubes, sheets, wire and coils can be treated to specifications. *Steel Processing Corp.*

For free copy circle No. 4 on postcard, p. 157.

### Calculating wheel

An extremely useful calculating wheel created as an aid to designers, engineers or anyone requiring a quick source of all physical properties of the various types of Meehanite metals available to industry, is found in the new Meehanite *Physical Specification Chart for Engineering Design*. Chart provides the engineering characteristics of all metals in the four major classifications under which Meehanite castings are produced. *Meehanite Metal Corp.*

For free copy circle No. 5 on postcard, p. 157.

## and Catalogs

**Rebuilt presses**

In response to growing interest in the opportunities for modernization of stamping presses through rebuilding, Verson Allsteel Press Co. has reissued its bulletin *New Life for Worn-Out or Damaged Presses*. Bulletin outlines Verson's rebuilding facilities and shows examples of typical rebuilding jobs. *Verson Allsteel Press Co.*

For free copy circle No. 6 on postcard, p. 157.

**Flush latches**

Illustrated 48-p. catalog describes and gives full details of complete line of flush latches. Included are dimensions, assembly, installation, combinations, and parts list. *Hartwell Co.*

For free copy circle No. 7 on postcard, p. 157.

**Fans**

Recent bulletin on Propellair fans for heavy duty applications offers helpful information concerning cooling and drying problems, system ventilation and open surface tank ventilation. Space limitations or other structural requirements often make these fans the ideal low cost installation. *Propellair, Div. of Robbins & Myers, Inc.*

For free copy circle No. 8 on postcard, p. 157.

**Hole drilling**

Hamilton A-M Super Sensitive small hole drilling machine is best suited for manufacturers engaged in production drilling of precision holes in small work pieces. All castings are normalized. Illustrations, diagrams and specifications are included in brochure. *Hamilton Tool Co.*

For free copy circle No. 9 on postcard, p. 157.

**Resins**

Information about molding, extruding and other ways to use Bakelite polyethylene as well as properties of resins is presented in new 8-p. folder. Literature contains photographs showing principal applications of the material for packaging, wire covering, housewares, pipe and industrial products. Three tables list properties of various Bakelite polyethylene resins available in commercial and experimental quantities and also of compounds that are blended with suitable colorants and anti-oxidants. *Bakelite Co. Div., Union Carbide & Carbon Corp.*

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*Turn Page*

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Read this new "WALLINGFORD QUALITY TUBING" booklet and get the complete story of how WALLINGFORD'S integrated strip and tubing mills, up-to-the-minute equipment and skilled craftsmen can help you solve your tubing problems.

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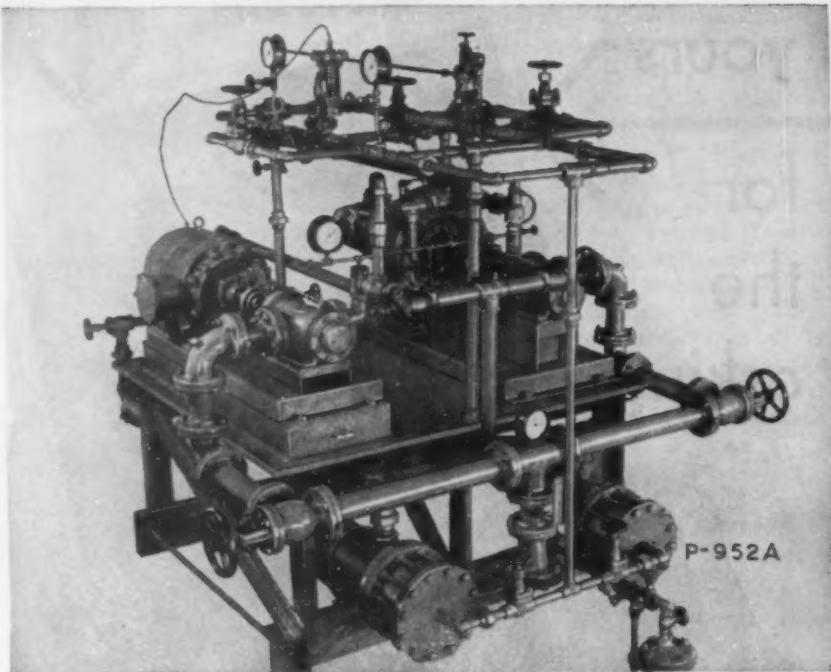
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P-952A—Steam Turbine and Electric Motor drive gives flexibility in this compact Model P-ES2H size No. 25 unit.

## NATIONAL AIROIL FUEL OIL PUMPING AND HEATING UNITS

NATIONAL AIROIL Fuel Oil Pumping and Heating Units are specially designed to prepare, for combustion, all grades of fuel oil including No. 6 or Bunker "C" Oil and residuums. They will draw fuel oil from above ground or underground tanks, preheat it to proper constant temperature and deliver it to Oil Burners at an even pressure, best suited for the burners. Our Fuel Oil Pumping and Heating Units are the result of years of experience. They come completely equipped ready for steam, exhaust, condensate, oil suction, oil return, and electrical connections. All valves, regulators, etc., are readily accessible. The piping arrangement is easily understood. These compact, space-saving units are available in a range of sizes and models in both Medium and High Pressure types. For complete details, write for our Bulletin 40 — very interesting and informative.

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SLUDGE BURNERS, Steam Atomizing  
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ATOMIZING OIL BURNERS  
DUAL STAGE, Combining Steam and Mechanical Atomization  
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AUTOMATIC OIL BURNERS, for small process furnaces and heating plants  
GAS BURNERS  
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### Free Technical Literature

Continued

#### Grinders

This 20-p. booklet shows how Job Engineered cylindrical grinders assure a high return on machine investment. Included is a discussion of the economics of low cost production and the Landis plan to reduce present high costs. Illustrated are applications, plain grinders with spaced wheels, automatic cycles, multiple wheel grinding set-ups, angular wheelhead grinding, special tooling and special single purpose cylindrical grinders. *Landis Tool Co.*

For free copy circle No. 11 on postcard, p. 157.

#### Speed reducers

Philadelphia Planetary Speed Reducer is fully described in 16-p. catalog. These in-line reduction units are constructed to perform, where other speed reducers fail. All helical gearing is specially heat treated to provide maximum life. Units are available in single, compound or double types and hp ratings are AGMA Class 1. Standard ratios range from 4:3 to 1, to 106 to 1. Catalog gives full construction details, diagrams, and selection tables. *Philadelphia Gear Works.*

For free copy circle No. 12 on postcard, p. 157.

#### Stud welding

Of interest to engineers, contractors and others concerned with stud welding is a specification sheet offered by KSM Products, Inc., describing in detail a new portable steel chest designed to hold a complete set of KSM stud-welding equipment. Illustration of chest shows packing arrangement to transport KSM control unit, stud-welding gun and accessories, miscellaneous equipment and orders or other papers relating to stud-welding jobs in hand. *KSM Products, Inc.*

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#### Metal powders

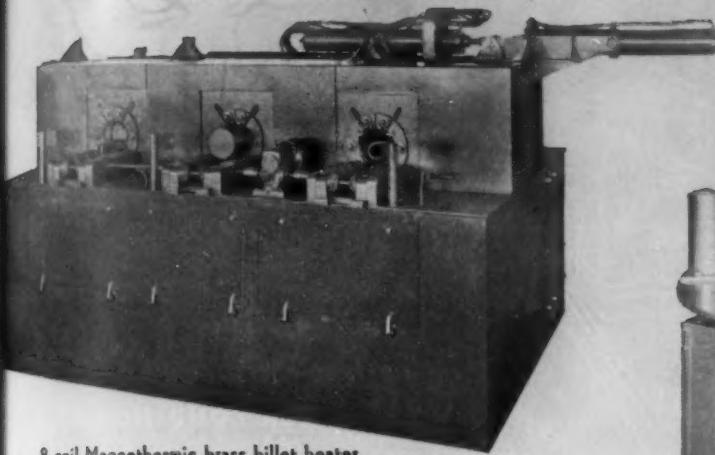
Resistox powders are made in a laboratory controlled completely new plant by a pyrometallurgical process. No soluble salts are present to promote oxidation. Purchase of resistox powders assures storage stability and large quantity commitments with the attendant savings can be made. In addition, advantage can be taken of favorable market conditions without fear of spoilage. *Glidden Co.*

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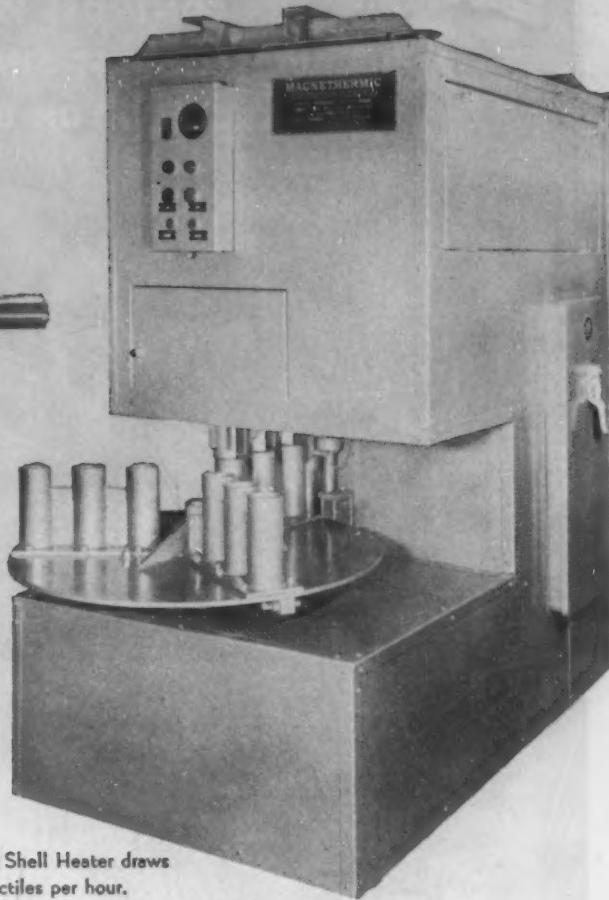
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# Why, Where, How and Wheresores...

of low-frequency  
(60-cycle) induction heat



8-coil Magnethermic brass billet heater  
is rated at 3,000 pounds per hour.



This Magnethermic Shell Heater draws  
200 (75 mm) projectiles per hour.

## HERE'S THE WHY

rapid and penetrating heat heating an 8" dia. copper brass billet in less than two minutes . . . on a production Temperature of each billet insured. Cold or over heated billets cannot reach the press. Need to schedule billets of time. A Magnethermic heater is always ready to go without warm-up time. Press button and you have a hot billet immediately.

## HERE'S THE HOW

You require a heater with either single, double or three coils, depending upon your production. A Magnethermic engineer will come to your plant and outline what you need and answer any of your questions. Setting up for low-frequency (60-cycle) heating is not complicated. Installation can be made in a matter of hours and floor space is at least a third less than for conventional furnaces.

## HERE'S THE WHERE

Use this penetrating heat for preheating, prior to hot working such as forging or extruding. You can heat rounds, squares, hexes . . . in lengths from slugs up to long bars. The diameter range: Steel (carbon or stainless) above 4" dia.; Brass above 2" dia.; Aluminum above 1" dia.; Titanium above 4" dia.

For example, this method has proved successful for annealing steel parts or preheating gears prior to shrinking or hardening.

## HERE'S THE WHEREFORE

The Magnethermic heats scale-free. An added incentive—this heat can be accomplished inexpensively in an inert atmosphere. Magnethermic has pioneered the use of low-frequency (60-cycle) induction heating and has installed most of the heaters in use. Much research on low-frequency (60-cycle) induction heating has been done in Magnethermic's research laboratories. Use this experience to help you decide which is the best heating method for your production.

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corporation  
3990 SIMON ROAD  
YOUNGSTOWN 7, OHIO

Your inquiry . . .

If you want information on a Magnethermic Heater for your plant, let us know what size billet you intend to heat; for what use; and desired production rate. Your inquiry will receive prompt attention.

# Electronic Brain

**CONTROLS WORLD'S  
LONGEST SINGLE-FLIGHT  
CONVEYOR BELT!\***



\* 11,000 foot rubber belt in  
mile-long conveyor handles  
coke between coking plant  
and blast furnaces at large  
eastern steel mill.

In this installation, the NEO  
TIME CURRENT ELECTRONIC  
ACCELERATOR (in white  
circle) is shown on an EC&M  
150 h.p., 440-volt starter.



**THE ELECTRIC CONTROLLER & MFG. CO.**  
2698 EAST 79TH STREET

CLEVELAND 4, OHIO

**EC&M AUTOMATIC ACCELERATOR  
MODIFIES TIME BY MOTOR CURRENT  
TO COMPENSATE FOR LOAD  
AND WEATHER CONDITIONS**

**THE EC&M NEO-TIME-CURRENT METHOD  
OF ACCELERATION** is not just time limit or  
current limit . . . it actually combines the ad-  
vantages of both to give positive accelera-  
tion modified by load conditions. As its name  
implies, it is inherently self-adjusting and  
automatically provides for (1) fast accelera-  
tion of an empty belt on a hot day and  
(2) slow acceleration of a loaded belt under  
icy conditions.

**NEO-TIME-CURRENT STARTER FEATURES:**

1. It permits use of single motor-drive on long conveyors.
2. Belt stretching is controlled within safe limits during acceleration.
3. Convenient adjusting dials can be set for slow start during break-in period and then gradually changed to give most efficient acceleration for best operation.
4. After tune-up, further manual adjustment is eliminated by automatic self-adjusting characteristic of the Neo-Time-Current.

*For Details and Specifications,  
Write Today for Booklet 1041.*

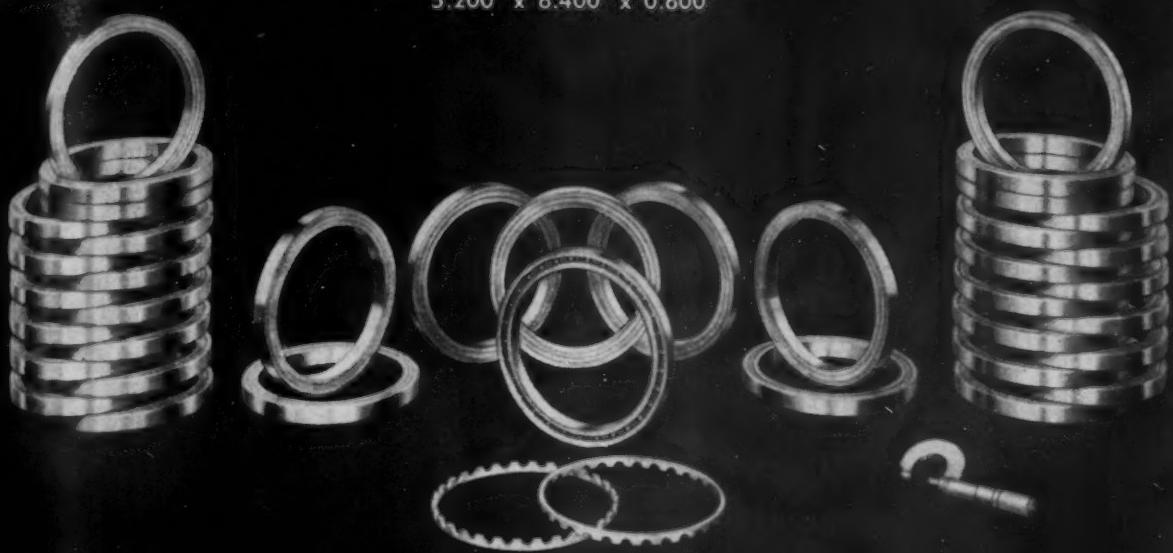




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FOR ALL TYPES OF BALL AND ROLLER BEARINGS: 4" BORE TO 120" OUTSIDE DIAMETER

Kaydon special radial ball bearings  
5.200" x 6.400" x 0.600"

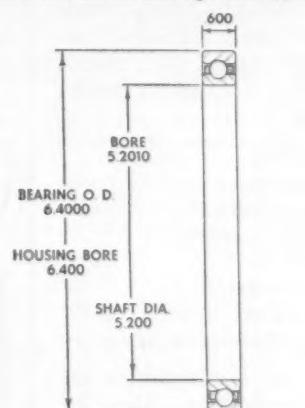


## Special radial ball bearings— industrial jewels produced by Kaydon

Unusual thin-section, high-precision bearings like these are standard products of the **KAYDON** Engineering Corporation. **KAYDON** designers and engineers have come to regard "near impossible" assignments as everyday routine.

That's why more and more manufacturers call in **KAYDON** on problems involving special bearings. They've happily found . . . that to build the special bearings they need . . . **KAYDON** has the unmatched experience and the facilities necessary to handle the job on an economical basis.

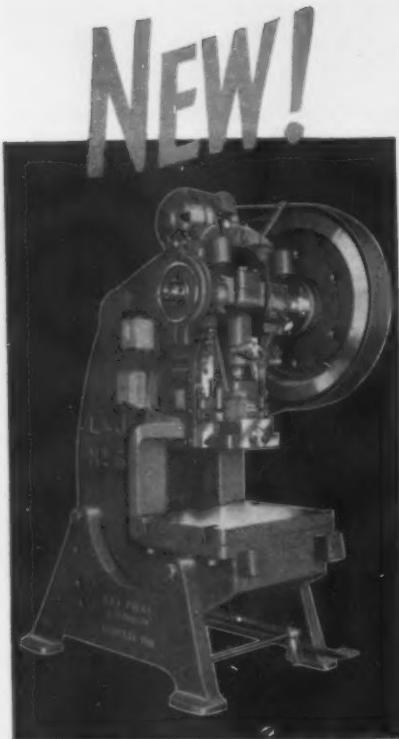
Details of thin section bearing shown above—



**KAYDON** Types of Standard and Special Bearings:  
Spherical Roller • Taper Roller • Ball Radial • Ball Thrust  
• Roller Radial • Roller Thrust • Bi-Angular Bearings

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PRECISION BALL AND ROLLER BEARINGS



## 65-ton L & J Press

Here's the new No. 6 press that gives you more value through features that insure efficiency and low production costs.

The heavy, rigid frame holds deflection to a minimum for greater accuracy and longer die life. Extra depth of throat adds versatility. Replaceable bronze bushings for main and upper ram bushings. Buttress threads on ram screw and replaceable hard bronze ball seat. Roller bearings in flywheel or main gear and backshaft mountings. Long, precision-scraped gibs maintain alignment and accuracy. Air clutch available. Also made in backgeared model.

### SPECIFICATIONS

Strokes per minute.....	85
Ram stroke, standard.....	4"
Max. stroke (to order).....	7"
Throat depth.....	13½"
Die space, standard*.....	13"
Special,* up to.....	19"
*bed to ram, stroke down, adjust. up	

Contact our local distributor for complete information. Also, 16 other O.B.I. models—6 to 80 ton capacities. Or, write for literature.

**L & J PRESS**  
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STERLING AVENUE  
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## Technical Briefs

### Solar Furnace:

Metals, ceramics melted in concentrated sun rays.

A solar furnace, one of the largest in this country, is being used to study metals and ceramics at Convair's San Diego division. Originally designed by Dr. Willi M. Conn, the furnace was used at Rockhurst College before Convair acquired it recently.

Basic part of the instrument is a 120-in. diam polished aluminum mirror formed into a parabolic reflector. Made of  $\frac{1}{4}$ -in. aluminum, the reflector draws its power from a  $10,000^{\circ}\text{F}$  heat source—the sun's surface.

### Collected and Focused

Rays from the sun are collected by the huge mirror and reflected to a focal point, forming a  $5/16$ -in. diam image of the sun at a distance of 34 in. from the center of the mirror. Materials being tested are held by metal jaws at this dime-size focal point.

### Develops Intense Heat

The intense heat at the focal point melts a steel bolt in a matter of seconds. When sky conditions are ideal, the furnace can develop a temperature of  $8500^{\circ}\text{F}$  approximately 85 pct of the temperature of the sun's surface. The temperature produced by an oxyacetylene torch, by comparison, is around  $5800^{\circ}\text{F}$ .

F. W. Fink, chief engineer, Con-

### IF YOU WANT MORE DATA

You may secure additional information on any item briefed in this section by using the reply card on page 157. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

vair's San Diego division, said Convair has found several advantages in using the solar furnace for research projects. Heating is accomplished under very pure conditions and in an oxidizing atmosphere. There is no interference from electric or magnetic fields or gases which often occurs when other types of furnaces are used.

### Illustrating the Principle

Heat treating or melting and freezing of samples can be observed up to the highest temperatures, and very short times of heating and cooling are possible.

The principle of the furnace's operation can be easily illustrated by using a flashlight reflector to light a cigarette. Sufficient heat is focused by a flashlight reflector, pointed toward the sun, for a smoker to light up.

### Radiation Is Controlled

A bridge structure spanning the mirror a short distance beyond the focal spot supports the specimen holder. After part of the sample



Solar furnace ...



Heat rays concentrated ...

melts, adjacent regions are moved into the focal spot by means of a motor-driven screw.

The bridge also supports a cylindrical barrel about 18 in. in diam. This is used to shade a part of the mirror from the specimen so that the amount of solar radiation concentrated on the specimen can be controlled.

The mirror has a central opening 22 in. in diam which permits easy observation of the focal spot area from a position on the ground behind the mirror. A telescope mounted at this opening permits viewing details of heating or melting magnified about 20 times.

#### Will Be Moved

In order to keep the focal spot in one location on the specimen, the mirror is mounted in a gimbal ring so that the polar axis of the mounting is parallel to that of the earth's. An accurate clock mechanism, driven by a synchronous motor, coordinates movement of the mirror with that of the sun, thus permitting extended experiments with the furnace.

Sky haze and clouds greatly reduce the efficiency of the furnace. In order to secure optimum performance of the furnace, Convair plans to move the equipment from San Diego to a nearby mountain top soon where sky conditions are ideal.



Ceramic melts at center . . .

Turn Page

May 20, 1954



For Midget or MONSTER..

**Unitcastings**  
*make Sense!*

And real production economy sense, too!

The old axiom about "the chain and its weakest link" still holds true. It takes *top quality parts, all the way*, to economically produce dependable equipment. Today's market demands it . . . and your product rating depends on it! It makes sense!

Unitcast pours a complete range of *top quality* carbon and alloy steel castings up to 150,000 pound tensile strength. No matter what the end use . . . or whether your needs are twenty or twenty-thousand, Unitcast will deliver *top quality all the way*! Unitcastings, delivered in coordination with your production make sense! Call today!

Take advantage of Unitcast's foundry engineering services, too! Experienced technicians will help you originate . . . or convert present requirements to Unitcastings. No obligation, ask about this service!

UNITCAST CORPORATION • Toledo 9, Ohio

In Canada: CANADIAN-UNITCAST STEEL, LTD., Sherbrooke, Quebec

**Unitcast**



QUALITY  
STEEL  
CASTINGS

"MULTI-CUT", "TUF CUT", "HOT WORK"

# Wapakoneta SHEAR BLADES and ROTARY KNIVES



Any type or size blade of proper  
Alloy with correct hardness and  
temper for every type shearing  
machine and every kind of job.

**RX** ENGINEERED  
TO THE JOB

Every Wapakoneta blade is made  
to exact specifications, designed  
for the particular job. Complete  
records with order number of  
each blade makes possible dupli-  
cation of exact size and temper  
at any time.

*The*  
**WAPAKONETA MACHINE CO.**

Shear Blade Specialists Since 1891

Wapakoneta, Ohio

## Technical Briefs

### Metal Forming:

Unusual process forms metal  
rapidly, at low cost.

A new, fast, low-cost metal-  
working process that saves crit-  
ical material has been developed  
by The Lodge & Shipley Co.,  
Cincinnati. By applying high pres-  
sures at the correct spot, the metal  
is made to flow in the cold state.

Using a hardened and polished  
roller, the pressure is applied in  
a continuous spiral manner, gradu-  
ally and accurately flowing a  
metal blank to the shape of a  
mandrel.

#### These Shapes Formed

Conical, cylindrical, combina-  
tions of those two, and other com-  
plex shapes are easily formed.  
The process, Floturn, starts with a  
simple flat blank, machined  
blank, machined forging, drawn  
cup, wrapped and welded cylinder  
or a centrifugal casting.

In many cases, with a single  
pass, the part can be produced  
directly to finished dimensions. In  
other cases, where extreme pre-  
cision is necessary, 0.015 in. may  
be left for machining.

#### Differs From Spinning

The method differs basically  
from the spinning method. In  
spinning, a blank considerably  
larger than the finished piece is  
used. Using moderate pressure,  
the blank is merely folded in a  
circular manner, using a hard tool  
against a round mold. This man-  
ual art requires a craftsman of  
considerable skill and experience.



Starts with flat blank ...

Turn Page

THE IRON AGE



The latest processing and production equipment for the food, chemical and petroleum industries is made of stainless steel. Practically unaffected by the corrosive action to which it is constantly subjected, this new equipment helps keep production costs down, greatly facilitates quality control.



Automotive applications for stainless steels become more numerous with each year's new-model cars and trucks. Today they include such diverse items as exhaust valves and door handles, water pump shafts and radiator grilles, decorative trim and truck bodies.



Lighter, more durable railroad cars are made possible by structural members and side paneling of strong, corrosion-resistant stainless steel. In both freight and passenger service, these cars are cutting railroad operating and maintenance costs, increasing the speed, safety and comfort of rail travel.



*Why so many are saying...*

# MAKE IT STAINLESS

Manufacturers of everything from can openers and hub caps to railroad cars and jet engines are now saying, more and more frequently, "make it stainless."

Virtually indestructible by corrosive action, stainless steels defy the effects of air, water, foods, fumes and chemicals. They can be machined, formed and fabricated; their surfaces can be polished satin-smooth or mirror-bright. There are grades of stainless available to meet a wide range of mechanical and heat-resistant requirements.

Stainless steels are cutting production costs, improving product performance and appearance, increasing customer acceptance in an ever-growing number of applications. For complete information in regard to your own application, contact your supplier.

The finest stainless steels are made with Vancoram ferrochromium, ferrochrome-silicon and ferrotitanium.



Architectural components of stainless steel range from screws, nails and decorative trim to roofing, curtain walls and theater marquees. Strong and corrosion resistant, they cut construction and maintenance costs, yet increase beauty and efficiency, in all types of modern buildings.

## VANADIUM CORPORATION OF AMERICA

420 Lexington Avenue, New York 17, N.Y.  
DETROIT • CHICAGO • PITTSBURGH • CLEVELAND

Producers of alloys



metals and chemicals



Specialists in Floor Safety Absorbents



### *Floor absorbent fire-hazard test—*

Note that a cigarette, continuing to burn itself out, has no effect whatsoever on an oil-soaked pile of ZORBALL!

## Wyandotte ZORBALL proves skidproof, FIREPROOF!

### SAFETY is FIRST with ZORBALL!

Wyandotte ZORBALL prevents skidding, slipping—and gives maximum protection against fire hazard!

Recent impartial laboratory tests have borne out the noncombustible nature of ZORBALL. Samples of ZORBALL, in these exacting tests, would not burn or even evolve combustible vapors!

Another sample of ZORBALL, saturated with cutting oil, burned for only one second after the test flame was removed. The flame was only  $\frac{1}{8}$  inch high and did not

spread beyond the area heated by the test flame!

ZORBALL will also stop slipping and skidding on icy steps, walks, loading docks, roads, etc.

ZORBALL resists breakdown... refuses to cake or mud even under heavy traffic conditions... is the safest, lowest "use-cost" floor absorbent known. Call in your Wyandotte representative for proof of ZORBALL's safety and economy. *Wyandotte Chemicals Corporation, Wyandotte, Mich. Also Los Angeles 12, Calif.*



\*REG. U.S. PAT. OFF.

Largest manufacturers of specialized cleaning products for business and industry



# Wyandotte CHEMICALS

Helpful service representatives in 158 cities in the U. S. and Canada

### Technical Briefs

The parts produced lack uniformity. Production is low.

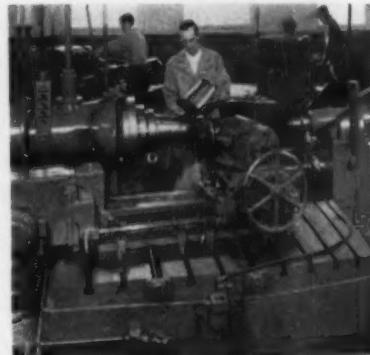
With the Floturn process, the diameter of the blank is exactly that of the finished part. Thickness is heavier than required in the finished wall. The additional metal flows into the extended shape.

The machine controls the operations; no particular skill is required of the operator. All pieces are uniform; dimensions can be held to  $\pm 0.002$  in. Production is high.

### Tested In Jet Production

The process has been tested in jet aircraft engine production. New alloys, including many considered hard to machine, are easily worked by the method.

Among metals successfully formed are: All 300 and 400 series stainless steels, Timken 16-25-6 and 17-225, Haynes Multimet, Universal Cyclops Uniloy 19-9, Inconel and Inconel X, Monel and K-Monel, Titanium T1-140-A, copper and aluminum as well as mild steel.



To roll form shapes...



Such as these...

Turn to Page 168

## New Books:

**History of roll making traced in recent book.**

Histories of manufacturing companies are increasingly useful as a source of historical data. Typical is a recent publication by Macintosh-Hemphill Co., Pittsburgh.

**"Rolling Mills, Rolls, and Roll Making."** Authors have attempted to dig beneath the surface to reveal and interpret a record of the rolling mill industry, the story of how it developed from a craft to its present status. The brief historical account of the industry's development extends from the fifteenth century to the present day. Mackintosh-Hemphill Co., 9th and Bingham St., Pittsburgh, Pa. \$5.00. 108 p.

**"Ferrous Process Metallurgy,"** by John L. Bray. Chapters on raw materials, the iron blast furnace, wrought iron, the Bessemer process, the basic openhearth process, the acid openhearth process, electric furnaces and ingots and ingot molds are included in this college text. Statistical material is kept to the minimum and free use is made of the indispensable tool of physical chemistry in explaining the processes and predicting future developments. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. \$6.50. 414 p.

**"Protection Against Betatron-Synchrotron Radiations up to 100 Million Electron Volts,"** National Bureau of Standards Handbook 55. Recommendations made by the National Committee on Radiation Protection are published in this handbook. They serve as guides for protection against the general hazards of radiation sources. Recommendations apply to high energy electron accelerators of the betatron and synchrotron types. Government Printing Office, Washington 25, D. C. 25 cents. 52 p.



# precision gears in quantity - at competitive prices!

PERKINS GEAR ENGINEERING SERVICES extend from coast-to-coast. Hence, no matter where you are located, we will gladly — and promptly — furnish estimates on your requirements for custom-made gears, and consult with you on the possibility of obtaining a more economical and highly efficient source of supply for the precision gears you require.

We do not manufacture stock gears. But once your specifications are in our files, re-orders are filled promptly — and delivered on time. We are equipped to produce gears in any quantity, any type, any material, metallic or non-metallic.

Let us present our conception of a modern and mutually advantageous gear engineering service. No obligation of course.

YOU FURNISH THE SPECIFICATIONS, WE'LL PRODUCE THE GEARS!

PERKINS MAKES: helical gears, bevel gears, sprockets, ratchets, worm gears, spiral gears, spur gears with shaved or ground teeth, ground thread worms.

NOTE: The PERKINS PRECISION SPRING COILER is the latest development in the spring coiler field and eliminates entirely the use of arbors and long set up time. It is a complete self-sufficient machine and enables you to make the spring you want when you want it—in seconds. The coiler produces any type

of spring, in any diameter and any pitch with this range: Wire sizes .005 to .125. Diameter, from 3/32" to 12" and larger. Size of the compact coiler is only 7 1/2 x x 16". A POWER MODEL mounted on a welded steel console cabinet base is also available. Full information on request.

**PERKINS**  
**MACHINE & GEAR COMPANY**  
**WEST SPRINGFIELD, MASSACHUSETTS**

**NOW!**

*new speed and economy—  
added ease and convenience.*

**APEX**

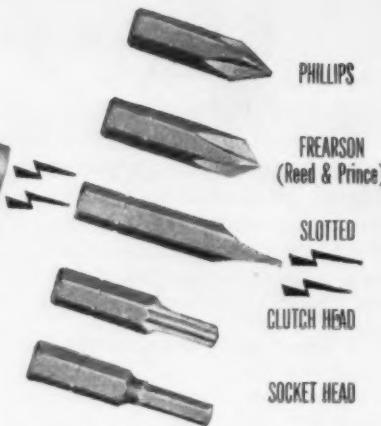
**MAGNETIC  
BIT HOLDERS**

*and*

**INSERT BITS**



APEX Magnetic Bit Holder  
Standard  $\frac{1}{4}$ " Hex Drive



PHILLIPS  
FREARSON  
(Reed & Prince)  
SLOTTED  
CLUTCH HEAD  
SOCKET HEAD

Any Apex magnetic bit holder will accommodate a full range of Apex insert bits. All bits are easily and quickly interchanged in the holder, permitting a minimum bit inventory to cover most screwdriving requirements. Insert bits "float" slightly in the holder to provide easier alignment with screw recess and to reduce bit wear. Insert bits may be economically discarded when worn; bit holders last indefinitely.

*Available for power, spiral and hand drivers*



APEX Magnetic Hand Driver  
Standard Length, Superloid Handle

Manufactured under Patent Nos. 2,550,775—2,522,217

Originators and Pioneer Developers  
of Bit Holders and Insert Bits

Non-Magnetic Bit Holders, Power Bits,  
Hand Drivers, Offset Drivers, Finder Sleeve  
Assemblies, Combination Hand Screw  
Drivers, Service Drive Bit Holders and Bits.

*for your production*

*screwdriving and nut running!*

# APEX

MAGNETIC  
SOCKETS

Apex MAGNETIC Bit Holders and Sockets place screwdriving and nut running among the simplest and fastest of all production operations. Your tool operators gain a new dexterity that eliminates costly lost time and motion when starting screws and nuts. Apex MAGNETIC operation is at its best in those hard-to-reach spots, even permits working straight down when necessary.

A permanent magnet in bit holders and sockets holds the screw or nut firmly in position. Bit holders have a bit retaining ring to keep the insert bit in place. This patented Apex construction prevents insert bits from pulling out of holder when in operation.

Apex offers the speed, economy, ease and convenience of a complete MAGNETIC operation for every production screwdriving and nut running application. Start now to reduce your driving and fastening costs by getting the facts about Apex MAGNETIC screwdriving and nut running.

*for Sheet Metal Screws*



Available with broached openings from  $\frac{1}{4}$ " to  $\frac{5}{16}$ ", for driving sheet metal screws, hardened and commercial cap screws.

*for Hex Head Nuts*



Available with broached openings from  $\frac{1}{4}$ " to  $\frac{5}{16}$ ", for running hex head nuts, bolts, pal nuts, etc.

Apex Magnetic Sockets, for use with power, spiral and hand drivers, have a permanent magnet which holds the screw or nut firmly in position. Saves time in starting and fastening work in hard-to-reach areas, permits one-hand operation when necessary.

## CATALOG 21

The authority on screwdriving and nut running tools, includes complete listing, specifications, prices. 56 illustrated pages. Write, on your company letterhead please, for your copy.

**APEX**  
**TOOLS**

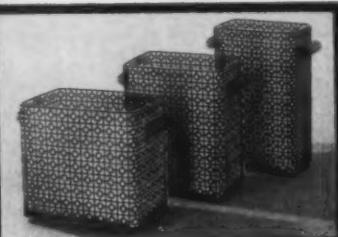
MAGNETIC bit holders, sockets

THE APEX MACHINE & TOOL COMPANY  
1029 S. Patterson Blvd., Dayton 2, Ohio



Distributed by Sun Glo  
Studios, New York, N. Y.

## Ideal design for the Ideal Mfg. Co.



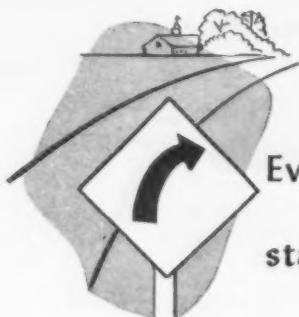
With today's trend toward modern styling, Hendrick is becoming more and more important to fabricators of metal products. Typical of these is the Ideal Mfg. Co. of Oskaloosa, Iowa, who manufactures the attractive home furnishing items shown above using Hendrick's Perforated Metal Square Link design.

And this is only one of hundreds of designs Hendrick can supply in commercially rolled metals and gauges with round, square, diamond, hexagonal or slotted perforations. If you would like further information, write Hendrick today.

### Hendrick MANUFACTURING COMPANY



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Perforated Metal • Perforated Metal Screens • Wedge-Slot Screens • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armogrids



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stands for dangerous curves  
...and smart gear buyers

know this sign  stands for  
the best in custom gears.



"Gears... Good Gears Only"

THE CINCINNATI GEAR CO. • CINCINNATI 27, OHIO

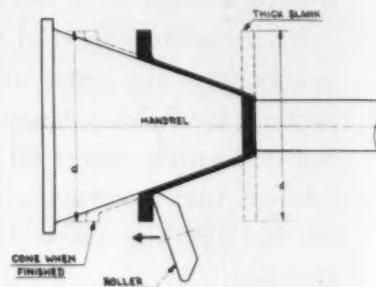
### — Technical Briefs —

Another advantage of the process is the fact that the method increases strength and hardness of the metal worked. Effects on the granular structure of the metal are comparable to those achieved by cold rolling.

In a typical example, working 302 stainless steel, tests show that the process increased tensile strength as much as 100 pct. Even after stress relieving, the increase still amounted to about 40 pct, it is claimed. Hardness increased from the cold rolled annealed state to between 57 and 59R 30X.

#### Relatively Simple Tooling

Tooling is simple, fast and low-cost. The cost is only about one-tenth the cost of deep draw dies. Tooling life is long, and results are claimed to be more uniform than in deep drawing. By combining machining with the process it is possible to produce parts considered impractical before.



How it works . . .

### Gaging:

New gage simplifies cutter adjustment for boring.

Adjustment of boring machine cutters has been speeded and simplified by means of a unique gage developed at Temco Aircraft Corp., Dallas.

The gage allows cutters to be set to within 0.0001 in. of desired position in a few minutes time. It is constructed to adjust cutters to only one setting, and is used only

## Technical Briefs

**Gage is a combination step-dial indicator mounted on a V block ...**

in cases where bore radius is constant for a large volume of work.

### Cuts Checking Time

Need for a gage of this type was first noticed by operators of an Ex-Cello-O boring machine. Although the boring cycle required was only 14 min., it sometimes took operators the same amount of time between cycles to mike-check the adjustment of the three cutters on the bore rod.

Micrometers also caused occasional damage to brittle carbide tips on the cutters. Their accuracy also depended, to some extent, on the user's experience.

### Overhangs Cutters

The gage is a combination step-dial indicator type, mounted on a small V block. A V block clamp fits in slots on the block's sides and secures the entire 4½-in. by 1¾-in. tool steel device on the bore rod.

The stepped part of the gage overhangs the cutters when the gage is secured on the bore rod. Each of three steps of the gage is cut so it marks the desired radius of sweep for its respective cutter. Cutters are adjusted by set screws so their tips touch the steps.

### Hand Honing Eliminated

For the third cutter, the one that makes the last, deepest and most exacting cut, a 0.0005-in. dial indicator gage is used to provide extreme accuracy.

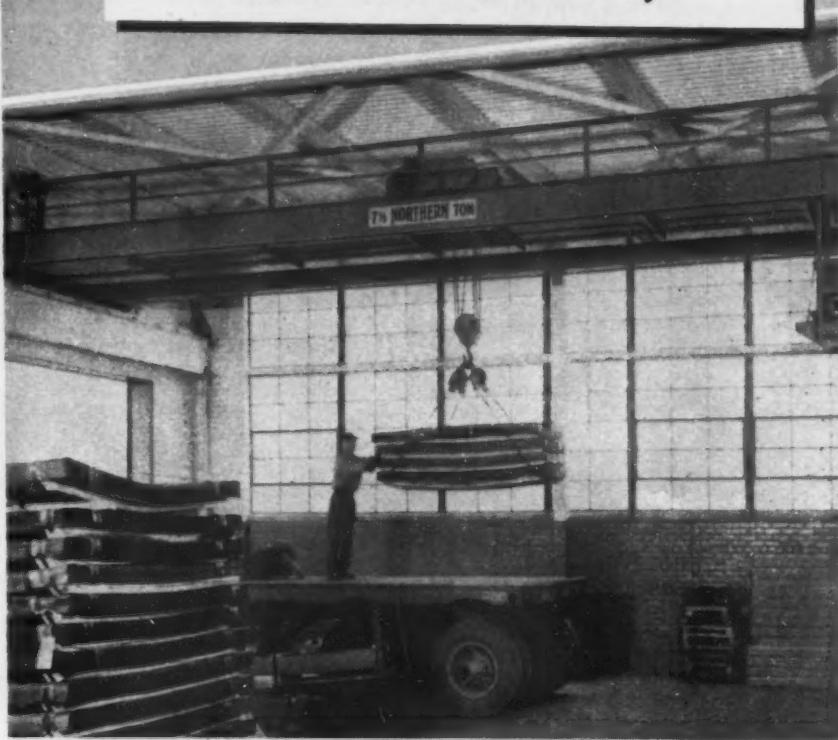
The indicator is mounted on top of the step gage. It is actuated by a plunger which the cutter tip touches when it is flush against its step. Operators have adjusted the gage so it reads zero when cutter adjustment is correct within 0.0001 in.

Since this gage has been in use, hand honing after boring has not been necessary, and set-up time has been reduced at least ½ hr per day.

*Turn Page*

# NORTHERN HI-LIFT CRANES

*keep them rolling!*



WHETHER handling strip, sheet, plate, structural steel or finished parts, a Northern Hi-Lift Crane helps keep your trucks and trailers rolling to make scheduled deliveries; handles big, heavy loads for fast loading; saves time, cost, and ruffled tempers.

For over fifty years Northern Cranes have consistently stressed three essential elements—safety, durability, dependable operation—with ample provision for meeting emergency demands under peak material handling conditions. They keep your production moving and your shipments rolling!

*Write for our new Bulletin HL-115*

**NORTHERN ENGINEERING WORKS**

210 Chene St., Detroit 7, Michigan

OVERHEAD ELECTRIC TRAVELING CRANES AND HOISTS

## Drop Hammer:

### Research guides design of new Air Force steam hammer.

Research with plastic models and strain gage analysis were used to develop improved frames and other parts in a new 40,000-lb steam drop hammer built by Chambersburg Engineering Co. of Chambersburg, Pa., for the Air

Force. The completed hammer will be one of three to be built for the Air Force.

The new design of the frames is the result of engineering studies which have been in progress in the Chambersburg laboratories for several years. In these studies four types of frames were compared. Photoelastic tests were made under both static and dynamic load.

The 40,000-lb hammers have newly engineered frames, and a special ram 70 in. front to back, which brings the total falling weight to 40,000 lb.

The sow block or cap is 80 in. front to back. The cylinder bore is 38 in., the stroke 65 in. Minimum die space is 22 in., the space between guides, 48 in. The hammer stands 26 ft 4 in above the floor line and weighs approximately 1,200,000 lb.

### Assembled Weight

The assembled anvil weighs approximately 875,000 lb and consists of an upper section which is a steel forging, weighing approximately 300,000 lb, mounted on two sub-bases, each sub-base being a Ceccoloy casting.

Models tested were made of  $\frac{1}{4}$  in. Catalin to  $\frac{1}{16}$  actual size at the cross section where the top of the ram strikes the column on off-center blows.

In static load tests, the load applied to the sides of the guide pocket was measured by means of a strain-gage on a steel member in tension. For the dynamic load tests, the models were suspended by thread and a blow transmitted by an electric hammer to a steel block in the lower corner of the guide pocket.

A strain gage on the side of the model picked up the stress wave as it passed through the model and tripped a flash bulb for a camera within a few microseconds after the blow was transmitted.

DISTINCTIVE ADVANTAGES	
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.

THOMAS FLEXIBLE COUPLING COMPANY  
Largest Exclusive Coupling Manufacturer in the World  
WARREN, PENNSYLVANIA, U.S.A.

Write for our new Engineering Catalog No. 51A

THOMAS COUPLINGS ARE MADE FOR A WIDE RANGE OF SPEEDS, HORSEPOWER AND SHAFT SIZES.

New drop hammer . . .

170

THE IRON AGE

## Tubing:

### Titanium tubing straightened rapidly on rotary machine.

Titanium tubing in sizes up to 1½-in. OD combines high strength and light weight with good resistance to both heat and corrosion, is being successfully straightened in one pass at Superior Tube Co., Norristown, Pa. The tubing combines high strength and light weight with good resistance to heat and corrosion.

Although 40 pct lighter than stainless steel, titanium tubing is considerably more difficult to straighten—size for size—than stainless steel. Titanium has a tendency to seize and gall when being worked by other metals. Zirconium, another reactive metal has much the same properties.

#### Meets Close Specifications

Operating procedures were developed so that only one pass through a Mackintosh-Hemphill rotary straightener produces lengths of titanium tubing to closer than commercial specifications for straightness. Many thousands of feet of tubing are straightened each week on two such straighteners. This equipment also straightens stainless, alloy and carbon steel tubing with wall thicknesses from 0.010 to 0.125 in., and in lengths from 10 to 30 ft.

Average length of titanium tubing is 12 ft, but with a new vacuum furnace about to go into pro-



Straightening tubing ...

duction, lengths will be increased to 24 ft.

Direct-current motor drives vary speed of the straighteners according to tube being straightened. Most tubing is fed into the units when set to run between one half and the full operating speed of 350 fpm.

These machines have helped solve two production problems.

They apply less cold work on tube surfaces than the previous equipment. This is important when specifications call for soft annealed tubing.

While straightening production of these machines does not exceed other machines, they provide a better surface finish as they have no guides to leave objectionable markings.

Turn Page

**NOW**

# Spray it Clean

with KELITE SPRAY WHITE  
and this money-saving  
**KELITE SPRAY GUN**



This amazing patented\* super-cleaner removes...grease, oil, wax, gum, dirt, dye, ink, soap, light carbon.

SPRAY WHITE does its work with complete safety...free from heat, odor, fumes, solvents, fire-hazard, or danger to skin.

This remarkable chemical compound, when used according to directions, is safe on all metals, plastics, rubber, porcelain, composition, or wood.

Send for list of 200 leading American companies who have bought Kelite Spray White, and Kelite Sprayers (200 in use in one plant). Thousands of companies are saving time and money, and keeping premises and equipment sparkling clean, with this exclusive and patented Kelite development.

**Spray White**  
made by  
**KELITE**

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1250 North Main Street, Los Angeles 12, California  
— Mail free Spray White literature and list of prominent users.  
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THE KELITE SPRAY GUN is rugged—easy to use. Polyethylene container is light, shatter-proof, holds 1 pint liquid. Send for complete description.

Service Offices in  
98 American Cities and  
16 Countries Abroad  
PLANTS IN LOS ANGELES  
BERKELEY HEIGHTS, N.J.  
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\* U.S. Patent No. 2,381,124

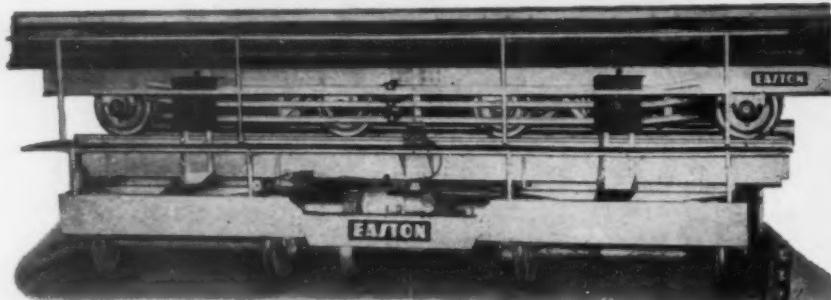


# EASTON

**EASTON** experience covers small and large capacity furnace cars for every requirement.

## Furnace Cars

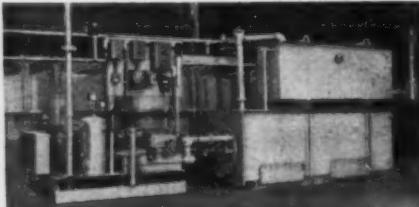
Electric furnace car mounted on electric transfer car for completely automatic continuous heat treating system.



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An EF installation consisting of a 1500 and a 3000 cfm exothermic horizontal water cooled type special atmosphere unit, each with desulfurizing towers and refrigerators for bright annealing steel and copper, and clean annealing brass.

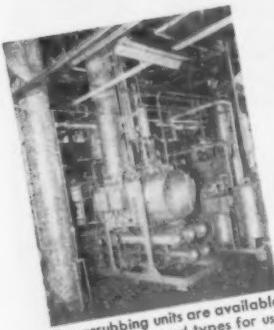


An EF kerosene exothermic gas generator. These are also built in several sizes and types for producing special atmospheres for use in bright annealing copper and steel products in areas where fuel gases are not available.



### SPECIAL ATMOSPHERE EQUIPMENT

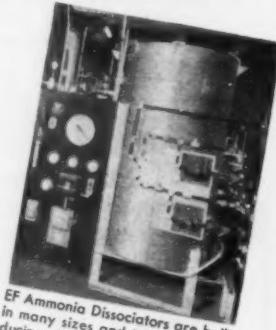
For any Heat Treating Process...any Capacity  
Long Experience = High Efficiency + Low Maintenance



Gas scrubbing units are available in several sizes and types for use with any type of EF special atmosphere generating equipment where it may be necessary to remove CO<sub>2</sub> or H<sub>2</sub>S.

As pioneers in the development and use of equipment for producing low cost special atmospheres, we are in position to furnish a wide range of reliable, thoroughly tested special atmosphere units, including endothermic and exothermic gas generators, ammonia dissociators, refrigerators, dryers, desulphurizers, gas scrubbing units and other special atmosphere equipment—equipment with a reputation for high efficiency,—and low maintenance and operating costs.

Submit your furnace or special atmosphere problems to experienced engineers — IT PAYS



EF Ammonia Dissociators are built in many sizes and types for producing highly reducing atmospheres as required for bright annealing stainless; and other annealing and normalizing processes and preventing decarburization.

**THE ELECTRIC FURNACE CO.**

WILSON ST. at PENNA. R.R. Salem - Ohio

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION

### Technical Briefs

#### Metals:

Titanium blades increase helicopter pay loads.

Use of titanium as a skin covering for helicopter rotor blades has been reported by the Titanium Metal Corp. of America. The blades have been shipped to the Philadelphia Navy Yard where the Bureau of Aeronautics will conduct whirl and flight tests this summer. Prewitt Aircraft Co., Clifton Heights, Pa., designs and manufactures the blades.

Titanium as a replacement for alloy steel in helicopters uncovers an important secondary weight saving. While a ship-set of six blades requires only 52 lb of titanium, there is an overall weight reduction of 68 lb.

#### Blades Balanced

This weight saving is brought about because the blades are mass balanced at a point one-fourth the width of the blade from the leading edge. Thus, for every unit of weight saved aft of this point, a three-fold weight reduction is gained in the forward portion. Also, use of the lighter rolled titanium enables removal of additional weight elsewhere in the structure.

With present day helicopters selling at upward of \$75 per lb of pay load, the value of the weight saving in the titanium-skinned blades is more than two-thirds the cost of the blades in production.



Titanium skin cuts weight.

## Plating:

New process plates nickel directly on aluminum.

Direct application of nickel on either raw or anodized aluminum is possible by a new process developed by Bart Laboratories Co., Belleville, N. J. It gives the aluminum an erosion-resistant surface and materially strengthens it. No intermediate bonding material, such as copper or adhesive cements, is necessary to establish a strong bond.

### Small Weight Increase

Even very thin deposits of nickel over the aluminum provide a surface that is resistant to erosion, pitting, gouging and corrosion. When deposited to both surfaces of aluminum sheets, the nickel deposit greatly strengthens the aluminum without materially increasing the weight.

Intricate designs and shapes, such as castings, can be given uniform and accurate protection of both interior and exterior surfaces.

### Stress-free, Ductile

With the new "alni-clad" process, a stress-free, ductile and pore-free surface can be applied in any required thickness. The material produced can be sheared, bent or fabricated, and because of the tenacious bond, it is not subject to separation even at high temperatures.

Wide variation in the characteristics of the nickel deposited can also be secured. The hardness of the deposit can be varied over a wide range, from 150 to 550 Vhm. Nickel can be deposited in layers, with a soft layer against the aluminum for resiliency and an extremely hard outer coating. The nickel can also be deposited with either compressive or tensile stress.

Increased corrosion resistance and strength, made possible through direct plating of nickel on aluminum, offers designers a new material combination. The nature of the bond assures adherence of nickel and aluminum during forming.

# It's the Finish that Counts



COMPOUNDS  
AND CHIPS ARE MADE TO GIVE YOU  
THE PROPER FINISH ECONOMICALLY



There are other brands of materials that resemble Roto-Finish chips and compounds . . . but only Roto-Finish chips and compounds give you the *extra advantage* of continuous research by the company who originated the Roto-Finish processes. Roto-Finish chips and compounds are carefully manufactured so *you* obtain the best results on *your specific job*. To obtain the best results at the lowest cost . . . insist on ROTO-FINISH chips and compounds.

ROTO-FINISH puts your grinding, deburring, descaling, polishing, brightening or coloring operations ON A MASS PRODUCTION BASIS



SAVES MAN HOURS AND MONEY by  
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GIVES ABSOLUTE UNIFORMITY...in any quantity.

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CUTS FINISHING costs as much as 80%.

LOWERS INITIAL and MAINTENANCE costs.

### ROTO-FINISH COST-FREE ENGINEERING SERVICE GUARANTEES RESULTS

Put the experience and facilities of Roto-Finish to work for you on *your special finishing problems*.

Send a few unfinished parts to us . . . plus a finished part as a guide. We guarantee that you will get the same results in your plant that we produce in our laboratory. There's no obligation.

Write for fact-packed Roto-Finish catalog for complete information.

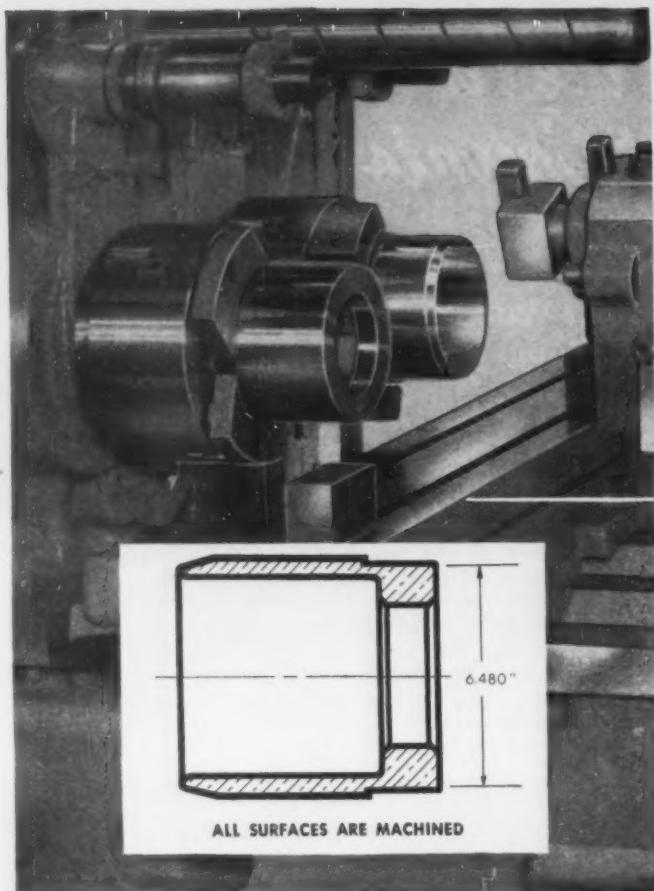
# Roto-Finish

associated with The Sturgis Products Co.  
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# TWO-SPINDLE Automatic Turret Lathe DOUBLES PRODUCTION

**THIS BRONZE CASTING  
COMPLETELY FINISHED**

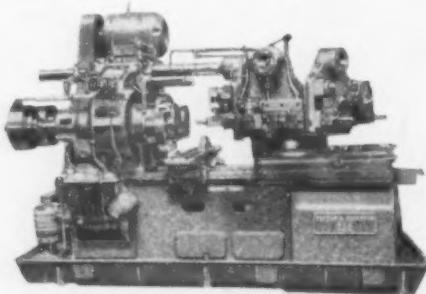
**. . . in one turret cycle  
. . . in 4.48 minutes**

(FLOOR-TO-FLOOR TIME)

**WITH A**

## 5D-2 POWER-FLEX Automatic Turret Lathe plus P & J Tooling

To get more production per unit of floor area, consider the P&J 2-Spindle Automatic Turret Lathe. With double spindles driven from a common power source, this machine far exceeds the output of any single-spindle type for work within its range. And you'll cut costs FOUR WAYS. One P&J 2-Spindle Machine uses far less power . . . costs far less initially . . . takes half the floor space . . . and is easier to operate.



Consider also features of the 5D-2 POWER-FLEX common to all P&J turning machines — automatic chucking, automatic speed and feed changes — ample power, rigidity and flexibility — time-proved construction that assures accuracy and long life, more return from your original investment.

See for yourself how the 5D-2 POWER-FLEX can bring greater profits to your plant. Send today for your copy of Bulletin 123 — or ask P&J Engineers to submit tooling recommendations based on your own prints or sample parts.



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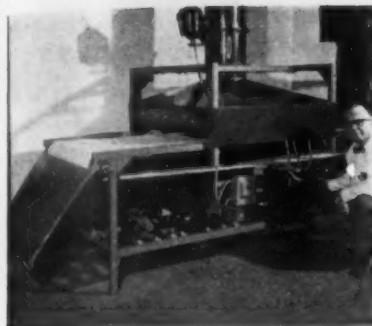
DIVISION NILES - BEMENT - POND COMPANY



FOR OVER FIFTY YEARS

# NEW EQUIPMENT

New and improved production ideas, equipment services and methods described here offer production economies...for more data use the free postcard on page 157 or 158.

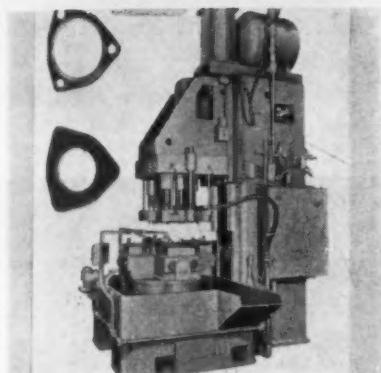


## Drying tunnel kits for screen process drying

Air-flow drying tunnel kits offer quick, low cost assembly of far-infrared tunnels for improved screen process drying. Rapid, controlled drying, saving of floor space and reduction of production costs are also advantages of the compact Chromalox drying tunnel. Two models suit the most frequent pro-

duction needs. With each, belt speeds from 5.6 to 23.4 fpm can be obtained and intensity of the all-metal heaters can be easily varied from 4 to 100 pct of their capacity. Each kit provides components for a tunnel with 36-in. wide belt. *Edwin L. Wiegand Co.*

For more data circle No. 31 on postcard, p. 157.

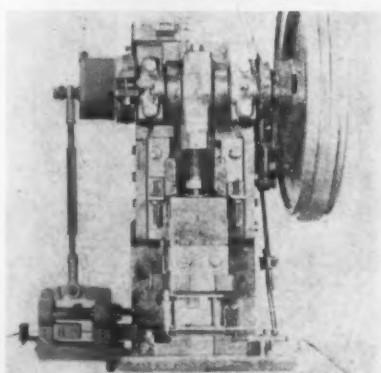


## Special machine features air-balancing system

An air balance system used on vertical machines to eliminate expensive counterweight assemblies, operates at 50 lb line-pressure. The storage tank cuts air consumption to a minimum. The machine is fully equipped with a safety device to guard against air failure or creepage during idleness. This Buhr special bores, drills and chamfers two automotive steel

flanges at a time, at a rate of 329 pieces per hr gross. The holding fixture, mounted on an automatic index table, is arranged with hydraulic clamping. The parts are clamped while fixture moves from load station to first work station, and are unclamped during return from final work station to load station. *Buhr Machine Tool Co.*

For more data circle No. 32 on postcard, p. 157.

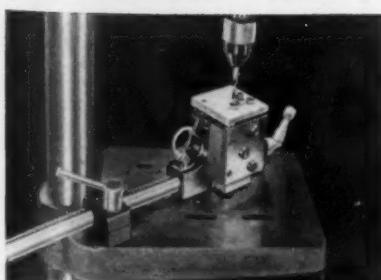


## Power press feed operates on gripping principle

Micro-Slide, as a new type power press feed is known, operates on a gripping principle. Stock is held lightly between two spring-loaded rollers which are set on an angle in such a way that material being fed can move forward only. One stationary roller acts as a stock check, the other reciprocal to effect a feed movement. Two micrometer stops act as positive limits and

may be preset to 0.002 or closer by use of gages. Micro-Slide adjusts automatically to accommodate various thicknesses of stock, within the capacity of the feed. It also adjusts automatically to variations in pressure, gripping more tightly in direct proportion to the resistance, without nicking or marking. *Nadel Mfg. Co.*

For more data circle No. 33 on postcard, p. 157.



## Improved vise speeds setups on production pieces

Eliminating need for up to 80 pct of drill jig parts, a new model of the float-lock instant change safety lock vise quickly adapts as the base for inexpensive two-plane jigs. It is designed for fast setups on production pieces and features a lightning-fast ratchet jaw. Any num-

ber of holes can be drilled without removing the work as the vise turns over on three sides for maximum drilling flexibility. Three bosses simplify jig attachment. *American Machine & Foundry Co.*

For more data circle No. 34 on postcard, p. 157.

*Turn Page*

## New Equipment

Continued



### Arc furnace control uses 1-way motor operation

Reduced cost in operation and maintenance and more efficient melting with less line surging are major benefits offered electric furnace users, with a new simplified arc furnace control. Its ability to maintain a steady arc even under the most adverse conditions reduces operating costs. The control makes

use of motors which run continuously and always in the same direction for positioning electrodes to maintain balance of the arc and achieve maximum heat. The control is a completely integrated arc-furnace regulator and electrodepositioning equipment. *Whiting Corp.*  
For more data circle No. 35 on postcard, p. 157.

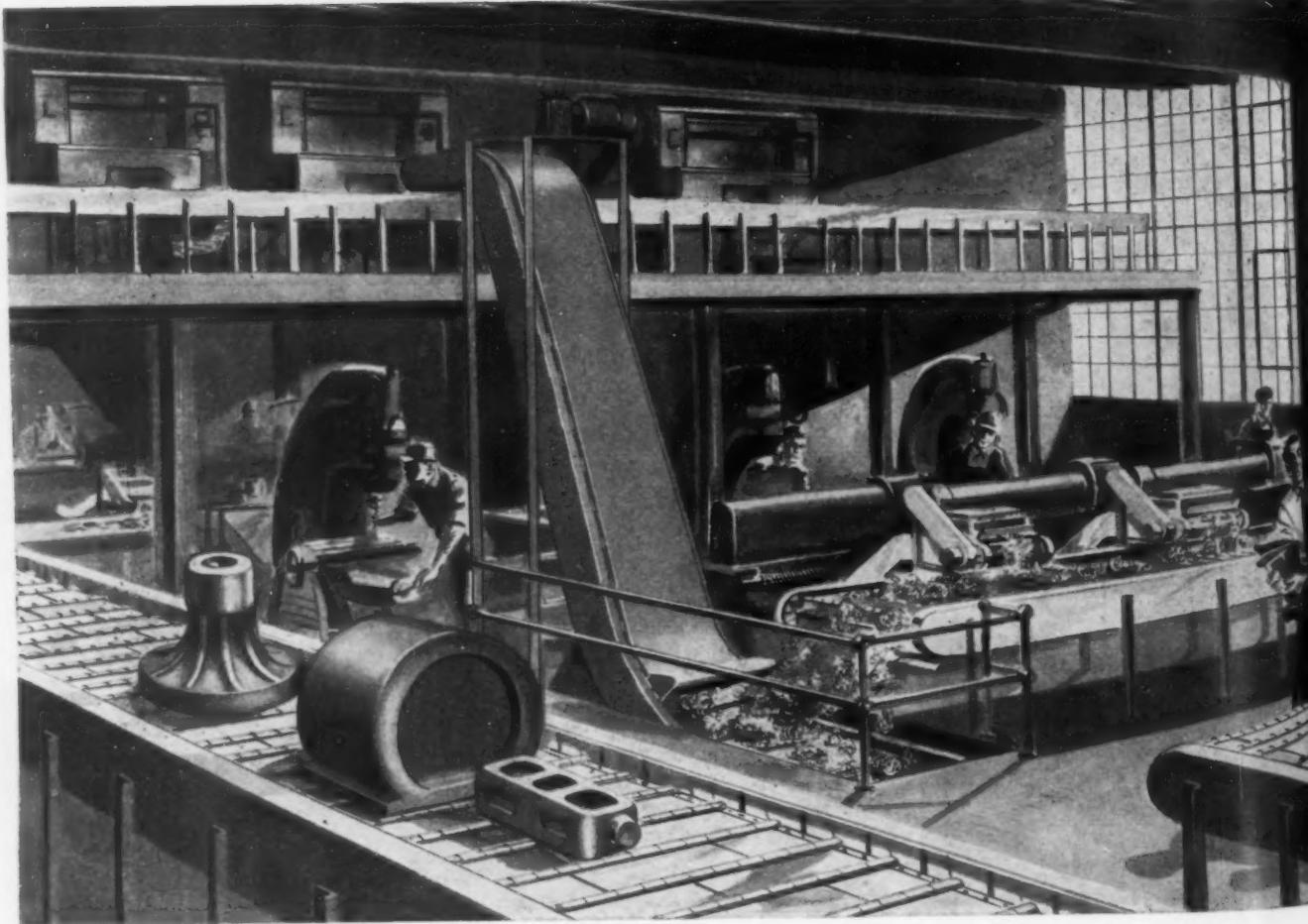


### Bonded rubber linings reduce repair shutdowns

Crippling effects of corrosion and abrasion are no longer stopping production schedules. By using bonded rubber linings, failure of equipment and repair shutdowns due to the disintegration of metals, are being greatly reduced. Eating away of steel surfaces have been stopped by rubber sheet lining installed in tank cars, agitators in mixing units, fans and fan housings, pickling tubs, chemical processing tanks, and continuous

vacuum filters. The product is applicable to all shapes and sizes of tanks, castings, and welded equipment. It can effectively seal against most corrosive liquids; will not slough off; and will not crack or buckle under alternate drying and wetting. Usual thickness of the lining is  $3/16$  in., a nonporous sheet capable of protecting steel against strongest acids. *Goodyear Tire & Rubber Co.*

For more data circle No. 36 on postcard, p. 157.



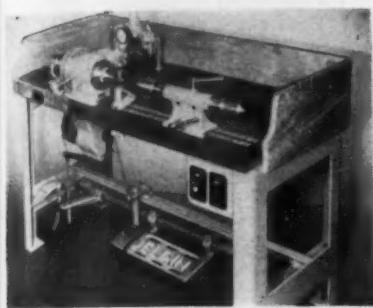


## Generator continuously supplies high grade gas

Acetylene is delivered continuously, without interruption for water changes, residue removal or carbide recharging by the new Oxfeld MP-11 acetylene generator. The MP-11 generates just enough gas to meet immediate demand from consuming equipment, even though this demand fluctuates over a wide range. Rated hourly output is 1000 cu ft, at a pressure of 13 psi, with higher delivery rates available for shorter, intermittent periods. Auto-

matic controls and practical safety devices reduce operating costs. Simplicity of design and heavy-duty construction insure trouble-free operation and minimum maintenance costs. Carbide feeding is automatically adjusted to consumption demands. The generator is delivered as a compact unit ready to be installed. It occupies 60-in. diam floor area. *Linde Air Products Co.*

For more data circle No. 37 on postcard, p. 157.



## Desk lathe convenient for women operators

Highly versatile production lathe provides a desk high bed and spindle for the convenience of women operators, plus an operating lever and pedals placed for fast and easy action. The lathe provides for instant spindle run-stop and collet position control, making it suitable for short turning, facing, and crimp-

ing operations. It is made in two models: the 4P7 with a 3/4-in. draw-in type collet and the 11/16-in. stationary type collet. It has a 7-in. swing, 15 in. between centers, speeds to 4000 rpm. *Elgin Tool Works, Inc.*

For more data circle No. 38 on postcard, p. 157.

*Turn Page*

## MAY-FRAN gives you greater economies in handling scrap and heavy abrasive materials

Whether you need a complete plant-wide system or a single scrap handling unit, MAY-FRAN can meet your requirements.

Two units form a complete MAY-FRAN materials handling assembly. The CHIP-TOTE automatic scrap conveyor removes borings, turnings and chips from high production machine tools while they are operating . . . thus eliminating shut-down time for manual scrap removal. Design features permit flexibility of installation according to type of machine tool, kind of metal scrap, rate of removal, etc.

The MAY-FRAN Hinged Steel Conveyor

Belt transports scrap and heavy abrasive material to the disposal point. Precision formed, heavy gauge hinged-steel links are connected in horizontal rows by means of high-carbon steel rods. Side chains become an integral part of the belt, and outside links incorporate interlocking wings which remain positively engaged at all times. Link and rod construction eliminates fall-through.

For full utilization of vital machinery and skilled manpower, mechanize your handling of scrap and heavy abrasive materials with a MAY-FRAN automatic system.

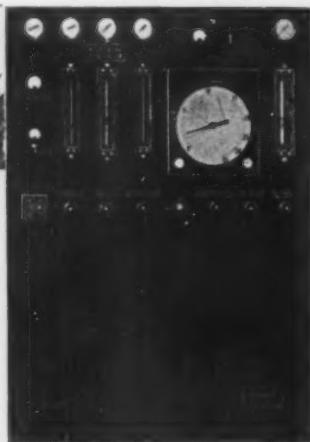
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**MAY-FRAN**  
ENGINEERING, INC.

Designers and Builders of Complete Handling Systems  
1698 CLARKSTONE RD. • CLEVELAND 12, OHIO



# HEAT TREATING OF STAINLESS STEEL



## NITRONEAL GAS GENERATOR

... Produces pure nitrogen with a controllable hydrogen content that can be varied at will and maintained at any percentage from .25% to 25% to best suit work in furnace.

Used for bright annealing, heat treating, and furnace brazing of stainless steel, low and high carbon steels and non-ferrous metals.

- Fully Automatic
- No Operating Personnel Required
- No Explosion Hazard
- 30% Less Costly than Dissociated Ammonia.

Units available in 100 C.F.H. to 10,000 C.F.H. capacities.

Write for Booklet No. 21

### BAKER & CO., INC.

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NEW YORK • SAN FRANCISCO • LOS ANGELES • CHICAGO

## New Equipment

Continued

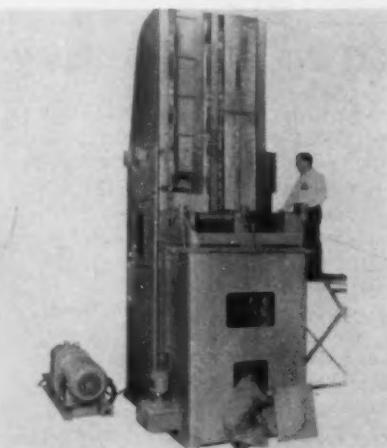
### Impact tester

For determining the breaking point of gear teeth and studying the dynamic properties of parts subject to shock, an automatic progressive and repeat impact testing machine has been announced. In operation, a hammer of known weight is automatically raised and dropped on the test specimen from progressively higher points until the specimen breaks. Quality of the material under test can be determined from the height of the fall at fracture and number of blows delivered. Specimen holder accommodates test materials up to 24 in. high. *Tinius Olsen Testing Machine Co.*

For more data circle No. 39 on postcard, p. 157.

### Broaching machine

A vertical broaching machine with electro-mechanical drive, although primarily designed for high-production broaching of large aircraft engine turbine buckets, is readily adaptable to mass production of many other parts requiring surface broaching. Variable speeds are easily obtainable through a simple turn of a knob on the side of the



machine. The electro-mechanical drive is designed around a constant torque variable speed dc motor, through a double gear box, and using a positive lock between the two rams. Smoothness of operation, at high speeds, is claimed to be due to weight of the machine, built-in rigidity, and the electro-mechanical drive. *Lapointe Machine Tool Co.*

For more data circle No. 40 on postcard, p. 157.

*Turn Page*

**Electro MANGANESE 99.9 + %**

STANDARD OF THE WORLD FOR PURITY

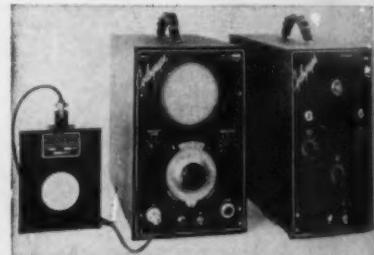
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BOX 479 KNOXVILLE, TENNESSEE

### It's Dice For The Best in Metal Test Instruments



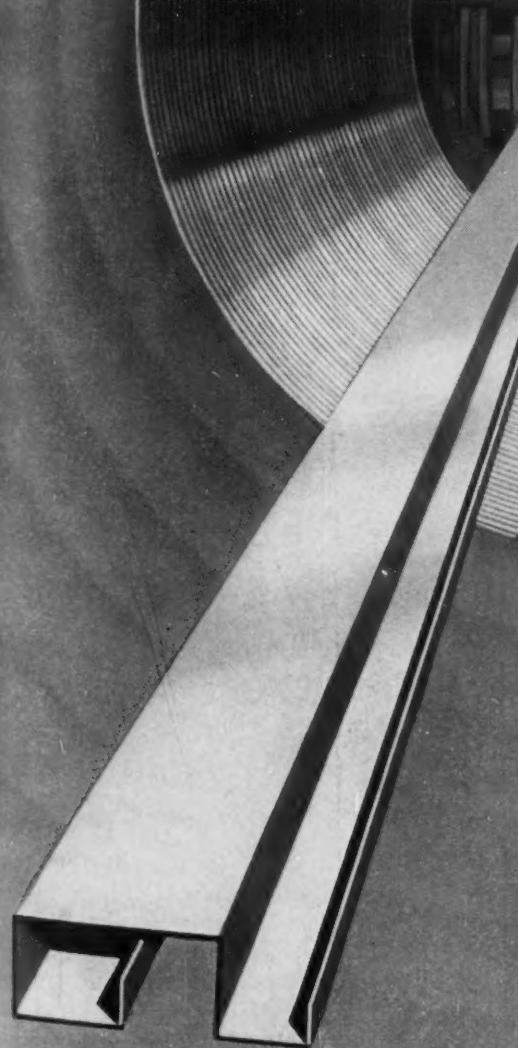
### The CYCLOGRAPH (Model C)

... for unscrambling metal mixups

This instrument permits truly high speed, non-destructive sorting of raw, semi-finished or finished parts by their metallurgical characteristics. With the new Automatic Sorter Unit speeds up to 300 pieces per minute are possible with the use of suitable feeding equipment. Used by leading industrial firms everywhere.

**J. W. DICE CO.,** Englewood 4, New Jersey  
Non-destructive Testing and Measuring Instruments

# INTRICATE FORMING



Weirton hot-rolled strip steel is the ideal material for forming intricate shapes. It has all the qualities that define ductility, meaning the ability to perform well in tough draws, deep draws, draws into all kinds of intricate shapes. Next time your plans call for a steel strip capable of the most complicated forming—call Weirton and be sure.

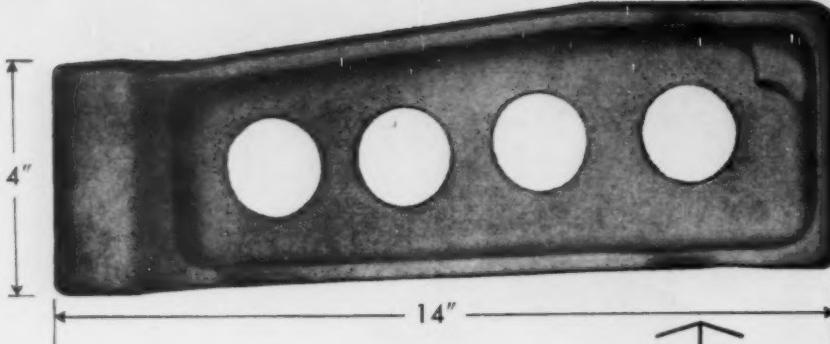
**hot rolled  
strip steel from WEIRTON STEEL COMPANY**

Weirton, West Virginia



**NATIONAL STEEL CORPORATION**





## From Jet Bomber Parts to Gas Range Burners

**MUELLER BRASS CO.**

**Aluminum Forgings Save  
Weight, Save Finishing Time  
and Provide the Same  
Strength as Steel**

If weight and strength are important factors in your product, then Mueller Brass Co. forged aluminum parts may be your best bet. Mueller aluminum forgings weigh only  $\frac{1}{3}$  as much as steel, yet they are approximately as strong. They make ideal parts for many applications and they are particularly desirable as parts for high speed rotating and oscillating machines because they reduce vibration and bearing loads, thus causing less wear on other parts. They possess good dimensional stability and retain their mechanical properties at high speeds and reasonable temperatures. The smooth, bright surfaces save machining time and eliminate costly finishing. Mueller Brass Co. can forge aluminum parts to your specifications in any practical size and shape from any of the standard or special alloys. Write us today for complete information.

**MUELLER BRASS CO.**  
PORT HURON 24, MICHIGAN



## New Equipment

Continued

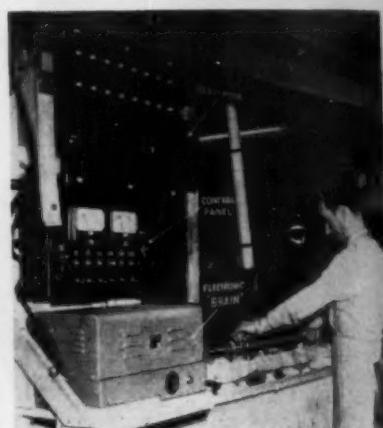
### Crucible lining

An improved crucible lining of white alumina has been developed for melting high nickel-iron alloys. One of the features of the lining is its ability to take a better glaze and improve bond strength. Also it will retain heat conductivity and other beneficial properties of the main body of the silicon carbide crucible. Cast iron may be successfully melted in the alumina lined crucible, it is stated. *Electro Refractories & Abrasives Corp.*

For more data circle No. 41 on postcard, p. 151.

### Plating controller

Automatic control of current and voltage for all types of electroplating is found in a new electronic device known as the Automatic Plating Controller. It eliminates the setting of switches when loading or unloading tanks, since current and voltage automatically



adjust to changing loads. Tank operator needs only to take care of loading and unloading operations, without need for manual adjustments. The A.P.C. is applicable to all plating solutions, and all tanks can be controlled by one supervisor from any remote location. *Unit Process Assemblies, Inc.*

For more data circle No. 42 on postcard, p. 151.

### Battery chargers

New line of battery chargers is introduced with this Precision-Charge unit for Edison batteries. Three models are available to cover charging requirements for bat-

*Turn Page*



### AUTOMATIC DRILLING & TAPPING MACHINES

of the Transfer type provide maximum automation for multiple operations. Hartford Special's custom engineered features assure top efficiency and economy in high production. For the best buy in the long run consult Hartford Special — new, detailed bulletin available on request.

Other Hartford Special production equipment includes Automatic Thread Rollers and Super-Spacers, the world's finest indexing device.

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comes  
to  
production...

come to

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*Special*

THE HARTFORD SPECIAL MACHINERY CO.

HARTFORD 12, CONN.

## New Equipment

Continued

series of 10 to 42 cells. Precision-Charge machines give a constant current charge for top efficiency in operation. Correct charging rate for any battery is set with a single

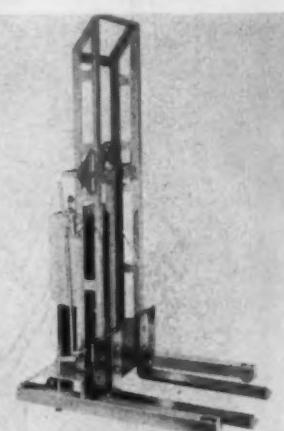


charging current control. A time control automatically starts the unit, connects the battery to the charging circuit and stops the unit when the battery is fully charged. A completely discharged battery is said to be brought up to full charge in 7 hours. *Lincoln Electric Co.*

For more data circle No. 43 on postcard, p. 157.

### 4-in-1 lift truck

This new model electric portable lift-truck operates as a fork-lift, straddle-lift, platform-lift and a drum-stacker with a lifting capacity of 1250 lb. As an all around lift-truck, for maximum economy



this unit includes many features such as snap-on platform, powerful hydraulic cylinder, built-in charger with automatic cut-off. *Safeway Industrial Equipment Corp.*

For more data circle No. 44 on postcard, p. 157.  
Turn to Page 186

# More "CRUSHING" FACTS on American CRUSHER PERFORMANCE

**\$120,000**

**EXTRA  
YEARLY  
PROFIT!**



### 5 American Metal Turnings Crushers Provide 3 Profit Sources:

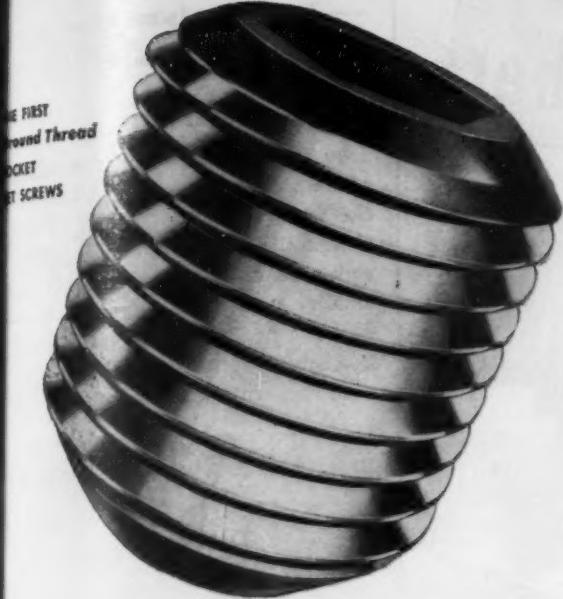
1. **Top Scrap Value.** With a battery of five American #3800 Crushers a well-known bearing manufacturer processed over 30,000 tons of metal turnings in one year. With shoveling chips bringing \$4.00 and more per ton on the scrap market . . . this volume would produce an additional gross profit of over \$120,000.00!
2. **Cutting Oil Recovery.** A bonus saving . . . since greater quantities (up to 50 gallons per ton) are released when turnings are reduced to chips and handled in a chip wringer.
3. **Easier Handling and Storage.** American-reduced chips save up to 75% on valuable storage space. Chips are easier to handle, too . . . permit faster, heavier loading in freight cars.

**WRITE for Metal Turnings  
Crushing Bulletin.**

**American** PULVERIZER COMPANY

1439 MACKLIND AVENUE

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**In Socket Set Screws  
PARKER-KALON gives you**

- **GROUND THREADS** — at no extra cost. Gage-like precision, mirror-smooth finish — uniform, dependable Class 3 tolerance. Mechanics like their easy starting, easy keying.
- **PROVED ASSEMBLY STRENGTH** The "proving ground" is the millions of assemblies made by thousands of satisfied users of P-K Socket Screws, whose products are used everywhere, many under the toughest conditions of vibration.

**In Socket Cap Screws  
PARKER-KALON gives you**

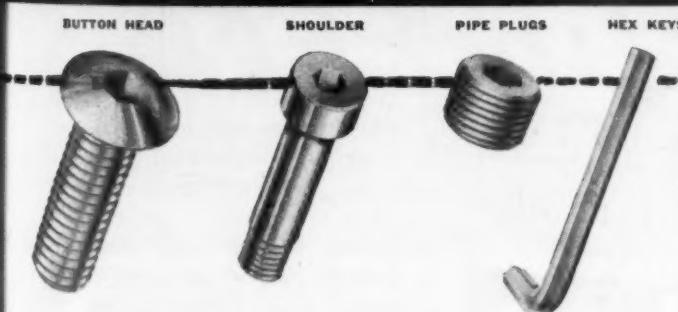
- **SIZE-MARK** — offered only by P-K. Incised on the head of each screw, it saves time and wasted screws when sizes get mixed up, prevents errors by green help. Maintenance and service men like Size-mark, it helps in reassembling.
- **GEAR GRIP** Meshing firmly with finger tips, it prevents slipping and fumbling when hands are oily, speeds starting.
- **MAXIMUM STRENGTH** Head, socket, and threads are accurately formed by Parker-Kalon's cold-pressure process. Steel structure "flows" to conform to all contours, assures maximum strength at points of greatest stress.

**In all Socket Screws  
PARKER-KALON gives you**

- **GUARANTEED FIRST QUALITY** Based on tests and inspections at every step in production — an exacting routine of quality control supervised by P-K laboratory Technicians.
- **FULL RANGE OF STYLES AND SIZES** You'll find any Socket Screw you need, NC or NF, in P-K's complete line, and Hex Keys in all sizes, and in several handy sets. Ask your P-K Distributor for the P-K Price List, Catalog, — any information you need. Slide chart Socket Screw Dimension Finder Free.



## SOCKET SCREWS



your local Supply and Service Specialist





The next time you're taking estimates on new presses let the Warco representative in your area give you the facts that have caused more people to buy Warco Presses the past year than ever before.

A few minutes with a Warco representative is all you'll need to see why the added quality designed and built into Warco Presses guarantee extra life at lower maintenance costs. You'll be introduced to many features, exclusive with Warco, that spell added safety, less operator fatigue and greater press speeds.

Too, your Warco representative is a specialist who'll work with you in getting a press that will do the most efficient job per dollar invested. And, you'll appreciate, like hundreds of others, the johhny-on-the-spot after sale service for which Warco representatives are noted.

So, next time you think of presses be sure you have the Warco story — it will pay you in the long run. Warco representatives located in all principal cities.

**THE FEDERAL MACHINE & WELDER COMPANY**

**WARREN, OHIO**



## New Equipment

Continued

### Wheel bearings

Two new tapered roller bearings are engineered to handle loads of the front wheels of 80 pct of new automobiles equipped with tapered roller bearings. The bearings are smaller and more compact. Inner front wheel bearing has OD of 2.328 in., contains 19 rollers. Outside bearing measures 0.157 in.

#### INNER FRONT WHEEL BEARINGS



#### OUTER FRONT WHEEL BEARINGS



less in OD than its predecessor; contains 14 rollers. Economies and improved riding qualities are claimed for the new bearings. Material can be saved on both spindle and hub; machining time on these parts will be reduced. Less lubricant is required. *Timken Roller Bearing Co.*

For more data circle No. 45 on postcard, p. 157.

### Phosphate cleaners

A group of phosphoric acid-type cleaners are suited for parts that are too large or heavy to be phosphate cleaned by standard production methods. Detrex' 800 series can be applied by brush, dip, sponge and flow-on. The new cleaners are especially compounded to meet particular requirements of each installation upon recommendation of a Detrex field service engineer. The cleaners can be specified to incorporate such properties as detergency, oil solvency, rust and scale removal. *Detrex Corp.*

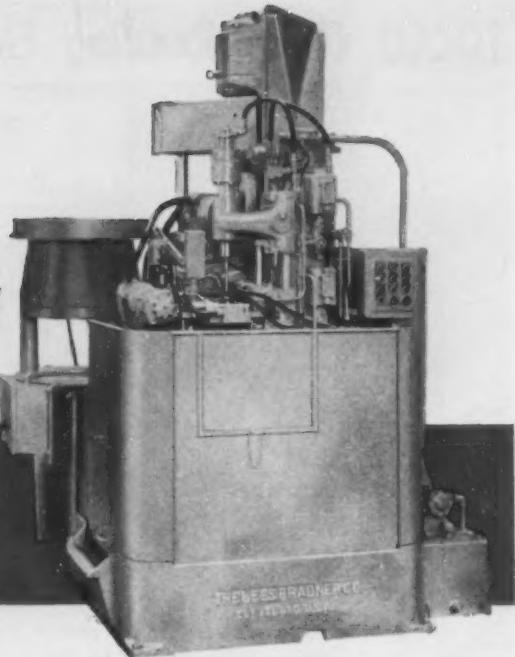
For more data circle No. 46 on postcard, p. 157.

*Turn Page*

# Automation is here ...from blank to gear!

## MODEL 7-A "AUTOMATIC" SINGLE-SPINDLE HOBBER

3" diameter, single-start hob      Hob one gear tooth every 45 seconds  
 Runs at 350 R.P.M.      16 teeth in gear  
 Feeds at .050" per revolution      Face width of gear:  $\frac{3}{8}$ "  
 Hob two pieces per load      Loading and unloading time: 2 seconds



The famous Lees-Bradner 7-A single spindle hobber has now gone completely automatic!

From blank to finished gear the whole operation is "push-button". Here's how it works:

Blanks are fed from a Syntron Vibratory Feeder down a rack to an automatic pick-up arm or loader.

The loader picks up two blanks at a time and moves them to the hobbing position under an expanding mandrel. The mandrel holds the blanks while the hob moves forward automatically to commence the hobbing operation.

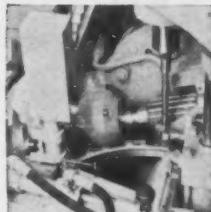
After the gears have been hobbed they are ejected by the loader as it sets the next two blanks in hobbing position.

As a control measure, the machine will not operate if:

- The blanks are not in the loader
- The blanks are not removed from the arbor
- There is not sufficient hydraulic clamping pressure

In the operation pictured the machine is hobbing a pinion gear for an automatic transmission.

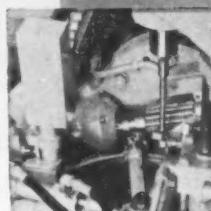
Write to the company for details on this amazing new automatic hobber.



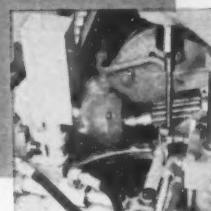
1. Arbor retracted ready for loading.



2. Loader arm moves to right with 2 blanks.



3. Loader about to eject finished gear from under mandrel.



4. Blanks held in place by mandrel ready for hobbing operation.

The Lees-Bradner 7-A Automatic Hobber is available in single units or quadruple mountings. (4 machines in line with common base, coolant tank, master control and feeder.)

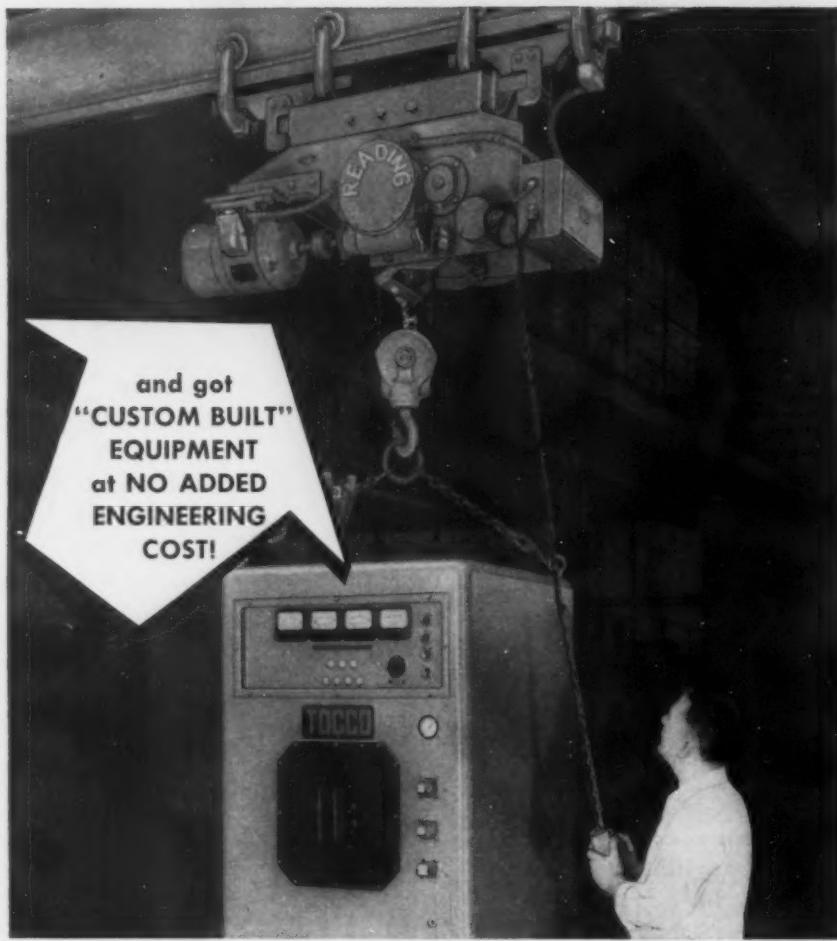
*the* **LEES-BRADNER** *Company*

CLEVELAND 11, OHIO, U.S.A.

MODEL R HOBBER HT THREAD MILLER 7-A ROTARY HOBBERS CRI-DAN THREADING MACHINES MODEL 40 THREAD MILLER SH SPLINE HOBBER 12-S HOBBER

IF YOU THREAD OR HOB . . . GET A BETTER JOB WITH A LEES-BRADNER

# TOCCO Chose Reading Electric Hoists . . .



This Reading electric hoist is moving a sheet metal cabinet from a heating station to the production line. All Reading hoists at Tocco have the same two-button pendant control.

- Rapidly rising production goals are being met in Ohio Crankshaft's new Tocco Division plant in Cleveland's South Side . . . thanks partly to Reading Electric Hoists.

Tocco, a leading producer of induction heating equipment, designed the new plant to meet the needs of its rapid expansion. Pre-planned materials handling, involving trucks, bridge cranes and electric hoists, is paying off in fast, orderly movement of materials from operation to operation.

Playing a big role in this integrated handling system is a series of Reading electric hoists, "custom-built" from standard Reading units to meet the exact requirements of each operation. These hoists permit Tocco workmen to move all material without manual lifting.

Reading's unique "Unit Construction" plan offers you special equipment for your own plant at the low cost of standard parts. Investigate now this proven way to get faster, better materials handling. A note on your company letterhead will bring a Reading engineer to analyze your handling operations . . . at no obligation.

Reading Crane & Hoist Corporation, 2101 Adams St., Reading, Pa.

**READING HOISTS**  
CHAIN HOISTS      OVERHEAD TRAVELING CRANES      ELECTRIC HOISTS

## New Equipment

Continued

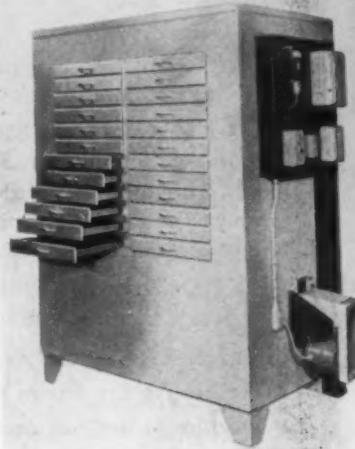
### Hand tachometer

A scale-changing device which reduces misreading of the various ranges is incorporated in a new portable, hand tachometer. Three different models, each having three ranges, are capable of measuring rotational speeds from 2 to 100,000 rpm and linear speeds from 2 to 10,000 fpm with accessories. Accuracy is said to be  $\pm 1$  pct of full scale under all conditions. *General Electric Co.*

For more data circle No. 47 on postcard, p. 157.

### Cabinet drawer oven

This oven is adapted to preheating and stress relief of small parts, for processing nylon powders and other processing up to 850°F. Special



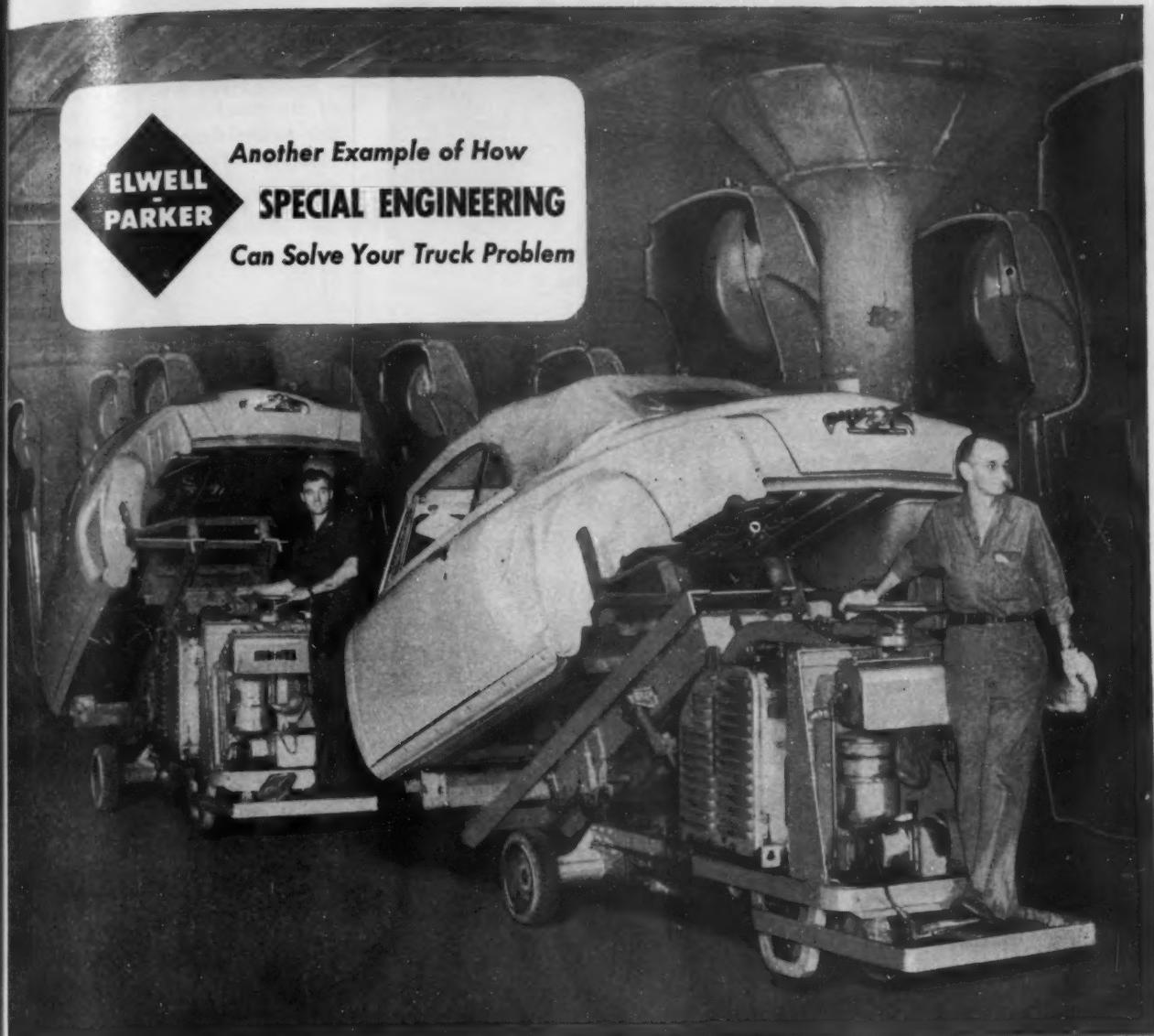
drawer construction which closes opening in cabinet when drawer is pulled out, permits insertion or removal of the contents of one drawer while keeping temperature at maximum required in the remainder of the oven. Features include uniform work chamber temperature, high volume adjustable air flow, Inconel sheathed Life-time heating elements. Size outside 34x28x54 in.; 24 drawers 2x12x26 in. *Grieve-Hendry Co., Inc.*

For more data circle No. 48 on postcard, p. 157.

### Double rivet setter

Compression rivets are handled and set in pairs in simultaneous operation by this automatic rivet setter. The tubular rivet is fed to a rigid position in the lower portion

*Turn Page*



**Another Example of How  
SPECIAL ENGINEERING  
Can Solve Your Truck Problem**

**ELWELL-PARKER**

## Save Space—Store Auto Bodies on End

**The Problem**—An ungainly object like an auto body is a hard thing to handle with a truck. Nevertheless it had to be done because this auto builder needed the space which could be saved by storing bodies on end in their warehouses. Fast, damage-free handling of the painted bodies was also a part of the problem.

**The Solution**—By **ELWELL-PARKER ENGINEERS**—They designed a special fork truck with a single tire fork and a pair of load stabilizing arms. The truck picks up

the body, tilts it to 45° for safe transport, and stores it vertically. A temporary wooden fixture is attached to the front end of the body to permit entry of the fork and to facilitate vertical storage.

**The Result**—Triple the number of bodies can be stored in the available space. Travel speeds of 400 fpm are attained and the trucks are highly maneuverable because of their three-wheel design. Damage to bodies is nil.

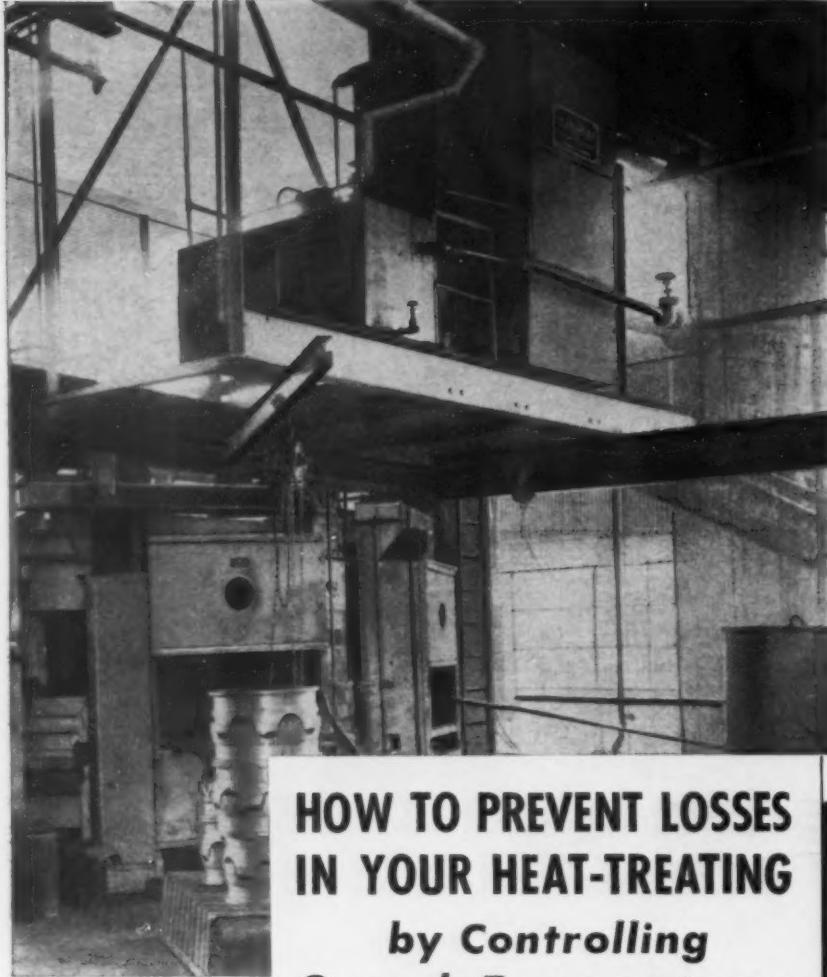
You can expect results like these when you apply the E-P Special

Engineering Service to your unusual load handling problem. When a standard Elwell-Parker model will not do, E-P Special Engineering is available without obligation.

**NEW BOOKLET**—Explains this unique service. Write The Elwell-Parker Electric Company, 4296 St. Clair Ave., Cleveland 3, Ohio.



**ELWELL-PARKER**  
**POWER INDUSTRIAL TRUCKS**  
Established 1893



## HOW TO PREVENT LOSSES IN YOUR HEAT-TREATING by Controlling Quench Temperatures

● Using Niagara's AERO HEAT EXCHANGER to cool your quench bath never fails to give you real control of the temperatures at which you wish to quench.

Your experience will be the same as others who have installed this method. You'll get better physicals; save losses and rejections; increase heat-treating capacity and production with lower costs. You can put back heat into the quench bath to prevent the losses of a "warm-up" period. You remove heat at the rate of input and prevent flash fires in oil quench baths.

You'll save space in your heat treating department and get a more productive arrangement because less room is needed for coolers and tanks. You'll find savings in piping, pumping and in the amounts of oil you will have to buy. And the saving in the cost of cooling water alone is enough to repay the cost of the Niagara Aero Heat Exchanger, usually in less than two years.

*Write for Bulletin 120 and further information*

### NIAGARA BLOWER COMPANY

Dept. IA, 405 Lexington Ave.

New York 17, N. Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

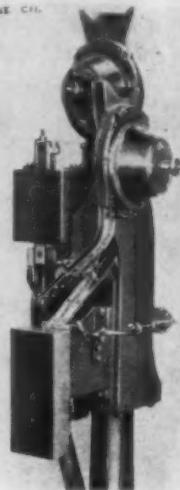
INDUSTRIAL COOLING      HEATING • DRYING  
**NIAGARA**  
 HUMIDIFYING • AIR ENGINEERING EQUIPMENT

### New Equipment

*Continued*

of the machine and acts as a pilot for assembling the elements to be riveted. The solid rivet drives from the top to meet the tubular and form a strong uniform fastener.

CHICAGO RIVET & MACHINE CO.  
KEDRON BLVD.,  
ILLINOIS

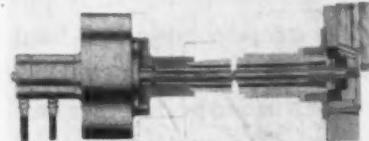


ing with rivet heads alike on both faces of the assembly. Rivets of this sort are most frequently used in cutlery work, but are not limited to such applications. *Chicago Rivet & Machine Co.*

For more data circle No. 49 on postcard, p. 157.

### Power chuck unit

Small lathes can operate with an economy and production speed of larger machines by using a new power chuck unit. With a minimum of simple machining, the unit can be adapted to almost any small lathe with 1 to 1 3/8 in. hole through the spindle. Skinner Junior is



lightweight and precisely balanced to minimize spindle bearing and braking loads. Work can be chucked internally or externally with extreme repetitive accuracy. The 8-in. self-centering chuck has gripping capacity from 1/4 to 6 in. Its 1/4-in. jaw travel exceeds the capacity of the collet, is valuable for second operation production work. *Skinner Chuck Co.*

For more data circle No. 50 on postcard, p. 157.

# THE IRON AGE SUMMARY...

- ◆ Ingot rate reaches highest point since February
- ◆ This may prove to be the market turning point
- ◆ Automotive buyers may start hedging soon

This week may prove to be one of the most important periods in the steel market during 1954; it may mark a turning point when production started up.

Steelmaking operations are estimated at 70.0 per cent of rated capacity, the first time since February that they have been scheduled that high. If this rate is actually achieved the production index will be 103.8 (1947-49=100). Last week the industry operated at nearly 71 per cent of capacity, although operations had been scheduled 2.5 points lower. In recent weeks production has rather consistently turned out a point or so better than anticipated.

It will take another week or two to determine whether an upturn in steel production has actually begun, or whether this is just a flash in the pan. Steel companies are now working close to their booking of new business, and production schedules have become sensitive to any real changes in demand.

Actually steel demand has been gradually improving for some time, even though the production record doesn't show it. Here's why.

Early this year producers chewed up their order backlog in order to keep operating rates from plummeting. But new business has gradually supplanted the shrinking backlog and permitted mills to keep production on a fairly even keel. Without improvement in new orders the operating rate would have come down as the backlog melted.

Although reversal of the trend of new orders has been a lifesaver to the industry, consumer demand still may not pack enough wallop to generate a substantial upturn in steel production.

Barring last-minute scare buying resulting from labor negotiations, the second quarter may be written off as far as a big upturn in production is concerned. Some producers are not too hopeful for the third quarter, expecting nothing significant until late in the period.

But a turn for the worse in the labor picture or deterioration of international affairs could change the outlook drastically, perhaps overnight. Steel consumers are quick to act when there is a chance their supply lines might be severed or pinched.

Steel salesmen in the Detroit area realize that automotive steel buyers are getting close to the end of present model buying.

Purchasing agents for auto companies are buying now for July auto production. It's the rule that this month's steel becomes next month's cars, and steel ordered today goes on June books. It is even a month earlier for the body companies who operate a month ahead of final assembly scheduled.

With several very early model changes coming up, some of the parts and body purchasers will start hedging shortly, followed in a month or so by auto company buyers.

This means that the present steel buying rate by auto companies will probably continue into June and possibly through June, but a sharp decline will likely materialize before the Fourth of July.

## Steel Output, Operating Rates

	This Week†	Last Week	Month Ago	Year Ago
Net Tons Produced (000 omitted)	1,688	1,690	1,636	2,250
Ingot Production Index (1947-49=100)	103.8	105.2	101.8	140.1
District Operating Rates				
Chicago	81.0	83.0*	80.0	105.5
Pittsburgh	71.0	72.0*	73.0	98.0
Philadelphia	60.0	59.0	60.0	98.0
Valley	67.0	67.0	61.0	102.0
West	77.0	73.0*	70.5	106.5
Detroit	79.0	78.0	73.0	109.0
Buffalo	67.5	67.5	67.5	104.5
Cleveland	67.0	74.0	68.0	94.0
Birmingham	76.5	56.5	53.5	102.0
S. Ohio River	82.5	80.5	77.0	89.5
Wheeling	88.0	93.0*	93.0	103.0
St. Louis	73.5	72.5	55.5	92.0
East	49.0	31.0	50.0	82.5
Aggregate	70.0	71.0*	68.5	101.0

Per cent of capacity for weeks in 1954 is based on annual capacity of 124,330,410 net tons as of Jan. 1, 1954. Per cent of capacity for last year is based on annual capacity of 117,547,470 tons as of Jan. 1, 1953.

\* Revised.

† Tentative.

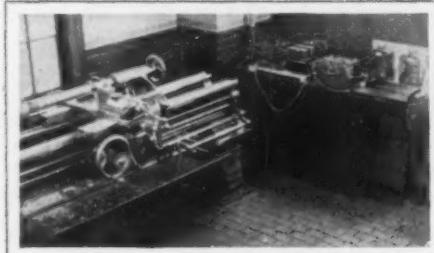
# Now... Picture These Advantages for Your Tools and Dies!

**Make this 3-Minute Check... Discover what has been put into a dependable die steel to help you get better die performance, lower costs!**

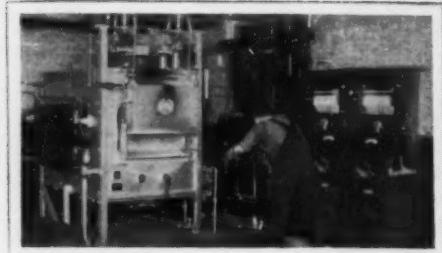
Improving existing die steels and developing new ones to meet the need for lower production costs, has been a challenge met by Carpenter. The results are modern die steels that heat treat and machine

easier to save time and money; run longer between grinds to reduce unit costs. Here are facts about *Stentor* (Oil-Hard) Die Steel—one of 12 modern steels in Carpenter's well-known Matched Set. Check what *Stentor* offers... compare it point by point with the die steel you now use. We believe you'll agree: Here is a real opportunity to put your tooling ahead of competition, take a big step to high quantity output at reduced unit costs.

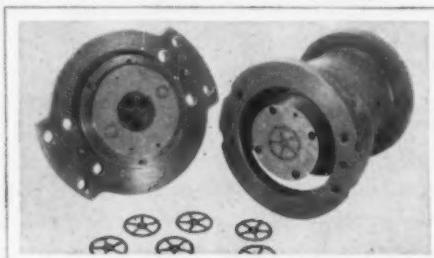
**Here is what *Stentor* gives you... COMPARE it with the die steel you use...**



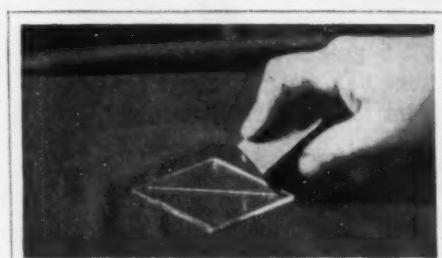
**Easy Machinability.** Two steels were put through this machining test. One, a well-known oil-hardening tool steel; the other, *Stentor* with its simplified analysis. Bars tested were  $3\frac{1}{2}$ " rd. with same Brinell hardness and structure. Result: With a cut .020" deep, *Stentor* proved to be 11% easier to machine than the other steel. Does the steel you use provide this extra economy in machining?



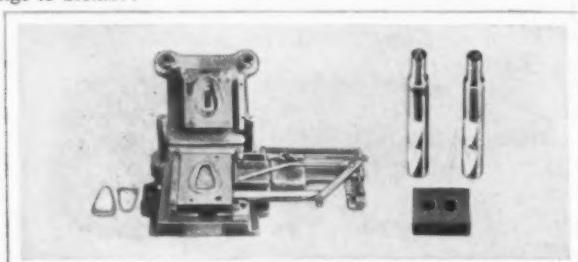
**Simplified Heat Treating.** Because of *Stentor*'s simplified analysis, it hardens from the low temperature of 1420° to 1450°F. This low temperature reduces dangers of size change and decarburization—holds warpage to an absolute minimum. How does the steel you use compare with this?



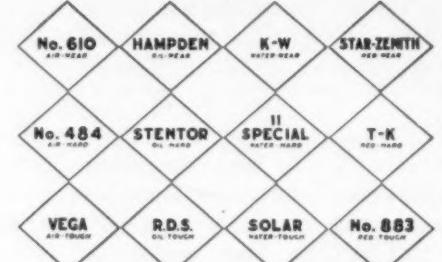
**Safety and Accuracy in Hardening.** This punch and die blanks 1.342" dia. timing mechanism gears having 120 teeth/90 pitch, made from 24 ga.  $\frac{3}{4}$ -hard brass. Customer reports: "In heat treatment the *Stentor* die moved only .0005" on the max. dia. of the gear!" If the oil-hardening steel you use doesn't behave like this, it's time to change to *Stentor*!



**Freedom from Decarburization.** Here is a *Stentor* part as quenched and before drawing, showing absence of soft skin. This test proves that *Stentor* tools when properly hardened are hard enough, right on the surface, to scratch glass! Does the steel you use give you this positive freedom from decarb?



**Full Dependability in Service.** Here are just two examples of the job *Stentor* does day after day in service. Die on left gave 83 continuous hours of production between grinds compared to 10 hours with a chrome-tungsten grade! The  $\frac{1}{4}$ " dia. punches shown to right above punch  $\frac{1}{4}$ " thick SAE 1020 steel. After *Stentor* was used production went up 160%. How much more output could you add to your total with dependability like this?



If you are not getting all of these advantages from the steel you use, you're missing a big opportunity to cut costs, raise output!

change to **Carpenter STEEL**

Matched Tool and Die Steels

...modern die steels engineered to meet today's requirements!

The Carpenter Steel Company, 121 W. Bern St., Reading, Pa.

Export Department: The Carpenter Steel Co., Port Washington, N.Y.—"CARSTEELCO." Get Immediate Delivery... Call your Carpenter Mill-Branch Warehouse, Office or Distributor.



# Markets at a Glance

**Building Paces Structural . . .** Demand is good on heavier structural sections but competition is increasing on standard sizes. Building construction is reported to be maintaining the Chicago market at a good level. West Coast demand is off from last year but no further decline is expected. In the fabricating end, price-cutting by smaller outfits in the East is costing larger companies many jobs. Even shipyards have entered bids on some bridge work.

**Buys Czech Mill . . .** New owner of the steel mill built in the U. S. for Czechoslovakia is an Argentine firm, Sociedad Mixta Siderurgia, Treasury Dept. decided this week. The successful bidder offered \$9 million for the complete lot of equipment making up the mill. All told, nine bids were submitted, some of them applying to only part of the equipment. The buyer will have to pay storage charges on the mill unpaid for several years by the Czechs. Proceeds from the sale are to be deposited in U. S. banks pending government study of U. S. claims against Czechoslovakia.

**Tube Demand Strong . . .** Demand for oil country goods is strong although market is becoming more competitive and consumers more deliberate in their buying. Third quarter orders are coming in more slowly as buyers make careful analysis of requirements. Outlook for the balance of the year is good with 2750 drilling rigs in operation. Standard pipe demand has leveled off after an upturn several weeks ago.

**Reopen Ensley Mill . . .** Openhearth furnaces, blooming and billet mills at Ensley, Ala., Works of Tennessee Coal & Iron Div., U. S. Steel Corp., closed down since Apr. 10 for repairs reopened May 16. Steelworkers voted to work a 4-day week to avoid layoffs. Fairfield Works will continue to operate on a 5-day week.

**Plate Volume Off . . .** Poor demand from railroad car builders has generally hurt the plate market. This condition is most felt in Chicago. Decline in expanded line pipe production on the West Coast has hurt one producer but a second continues strong. Although satisfactory, volume is off from first quarter last year when approximately 25 pct of all western plate was going into pipe.

**Stainless Shows Gains . . .** Market picture for stainless steels is mixed. Demand in Cleveland is good, but Pittsburgh producers, while noting slight change for the better are not greatly encouraged. Reports from Detroit indicate stainless sales have been holding up well all year, with demand for store front ornamentation showing a seasonal upturn. Dairy demand is also said to be good.

**Pittsburgh Business Drops . . .** Business in the Pittsburgh district fell to a new low for 1954 in the week ended May 8. University of Pittsburgh says the decline was due mainly to a large drop in freight shipments. Index fell to 143.3 pct of the 1935-39 average.

**Sheet, Strip Market Easy . . .** Easy sheet and strip market reflects depressed automotive and appliance demand. Pittsburgh producers foresee no change in third quarter due to vacations and auto model changes. Detroit market is spotty, although overall tonnage is good owing to high GM and Ford production. Low demand from independent automakers has cut into the Chicago market, although other stamping and press plants are doing better.

**Road Boosts Capacity . . .** Louisville & Nashville Railroad Co. will spend \$11 million in 1954-55 to increase capacity of its Birmingham, Ala., yard to 4000 cars. L & N is scheduled to put its new \$15-million-yard at Nashville into operation this fall. Next year the company will start construction of a \$10-million-yard and depot at Louisville.

## Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
--	-----------	----------	-----------	----------

### Composite prices

Finished Steel, base . . .	4.634	4.634	4.634	4.390
Pig Iron (gross ton) . . .	\$56.59	\$56.59	\$56.59	\$55.26
Scrap, No. 1 hvy (gross ton) . . .	\$28.08	\$27.58	\$25.67	\$38.17

### Nonferrous

Aluminum, ingot . . .	21.50	21.50	21.50	20.50
Copper, electrolytic . . .	30.00	30.00	30.00	29.875
Lead, St. Louis . . .	13.80	13.80	13.80	12.80
Magnesium, ingot . . .	27.75	27.75	27.75	27.00
Nickel, electrolytic . . .	63.08	63.08	63.08	63.08
Tin, Straits, N. Y. . .	93.50	93.00	96.25	\$1.00
Zinc, E. St. Louis . . .	10.25	10.25	10.25	11.00

## Nonferrous Markets

### Copper Deliveries Increase in April

**Domestic copper deliveries gained 9000 tons last month . . . Refined copper production lower . . . Firm predicts possible tight aluminum market at year end—By R. L. Hatschek.**

Healthy trends seem to be continuing in copper and aluminum—with some real bullishness evident in the latter. In copper, however, the longer-term crystal ball is a bit bearish despite steady high prices and increasing deliveries.

Disposal of the government tin smelter may well provide some sharp congressional skirmishing with politics, diplomatic relations with Bolivia, and local Texas interests all to be brought into the debates.

Of particular interest to lead and zinc producers, postponed hearings on the "new look" stockpiling program have been rescheduled for tomorrow (May 21) afternoon. Hearings will be closed but the subcommittee is expected to release at least the substance of its recommendations when the hearings end.

**Copper . . .** April statistics of the Copper Institute show a healthy increase of about 9000 tons in domestic deliveries of refined metal. Total for the month was 104,829 tons, highest for the year so far.

Figures show reduction in crude production, both primary and secondary, and in refined production. Crude primary totaled 70,713 tons, off almost 3000 tons; crude secondary was 6350, off about 1300 tons; and refined output was 112,617 tons, about 5000 tons lower than March.

Net effect was a slight decrease (1236 tons) in stocks of refined copper to 124,523 tons at the beginning of this month.

In scrap, dealers, custom smelters and ingot makers have all lifted their buying prices  $\frac{1}{4}\text{¢}$  to  $\frac{1}{2}\text{¢}$  per lb for copper and dealers have boosted a few other grades of copper containing scrap as well. On Monday, most grades of secondary ingot were boosted.

Senate action is expected to be delayed on a bill passed last week by the House continuing for 2 years the suspension of the 2¢-per-lb import tax on copper.

The Senate Finance Committee is not expected to consider the measure until after it completes work on the tax revision bill about June 1.

**Aluminum . . .** Only reason primary aluminum producers in the U. S. didn't set a new monthly record in April was that it's a short month. Daily average production topped 4000 tons for the first time in history to bring the month's total to 120,431 tons—not too far behind the record-holding month of March with 122,339 tons.

And, on the basis of a survey made by the company, Nichols Wire & Aluminum Co. predicts aluminum may even be "in fairly short supply by the end of this year." Blaming the first quarter dip on shorter range buying and inventory trimming, Nichols reports April and May sales higher than a year ago, as do some others.

Secondary aluminum ingot prices have slipped in the past week or so. Some alloys have held, others are off as much as 1¢ per lb. Steel deoxidizing grades are off about 1¢ to 1.5¢ per lb. At the same time, dealers have lifted their buying prices for aluminum scrap about 1¢ but ingot makers are holding their previous buying prices for the time being at least.

**Tin . . .** Sale of the government-owned tin smelter at Texas City, Tex., has been requested by the Administration. Legislation bearing the President's approval has been introduced in the House of Representatives which would permit sale or lease of the 12-year-old smelter to private industry.

Administration's point is that industry is importing all the tin it needs and continued operation of the smelter isn't justified. No further buying for the stockpile, which holds a 6 to 7 year supply, is anticipated. And Reconstruction Finance Corp., operator of the smelter, hasn't made a tin sale to industry since Apr. 1, 1953.

**Lead . . .** Market for lead continues in its steady pace with little change. Biggest news in lead during the week was the tally of imports during first quarter. Total incoming tonnage was 51,802 tons, as compared with 120,157 tons during first quarter 1953, American Bureau of Metal Statistics reports.

**Zinc . . .** Imports of zinc, on the other hand, soared to 57,470 tons in March to lift the first quarter total to 147,432 tons. This compares with 174,497 tons in the same period last year. Total '53 imports of 743,770 tons, you recall, set the alltime record.

**Antimony . . .** Prices for imported antimony are on the march as a result of a tight ore situation. Quotations are about 1¢ higher, standing at 27¢ to 27½¢ duty paid for 99.5 pct grade. Ores, too, are more expensive. Domestic prices, about 3¢ higher f.o.b. New York, are unchanged.

**Mercury . . .** Short supplies for early delivery are pushing quicksilver prices to all-time highs. Price has now moved up to \$260 per 76-lb flask and consumers are looking to Washington for aid, possible curtailment of stockpile shipments.

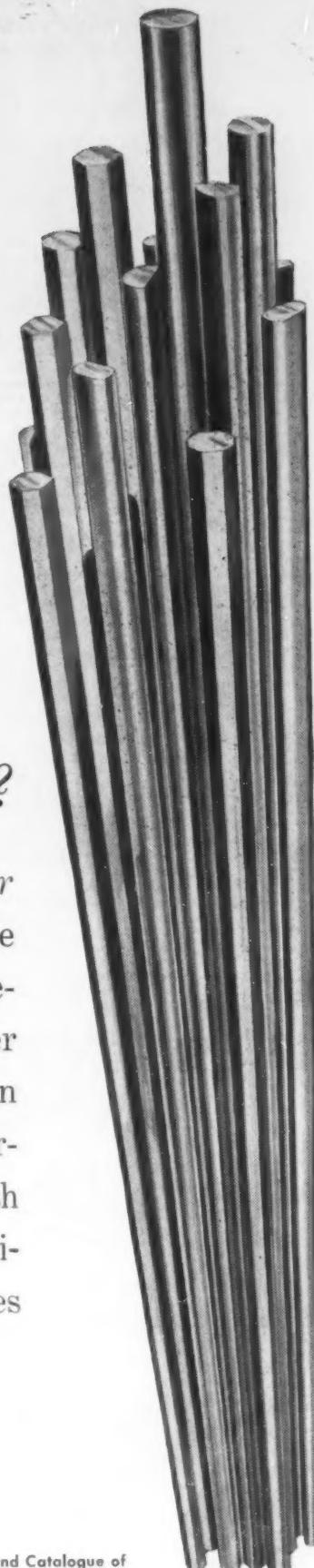
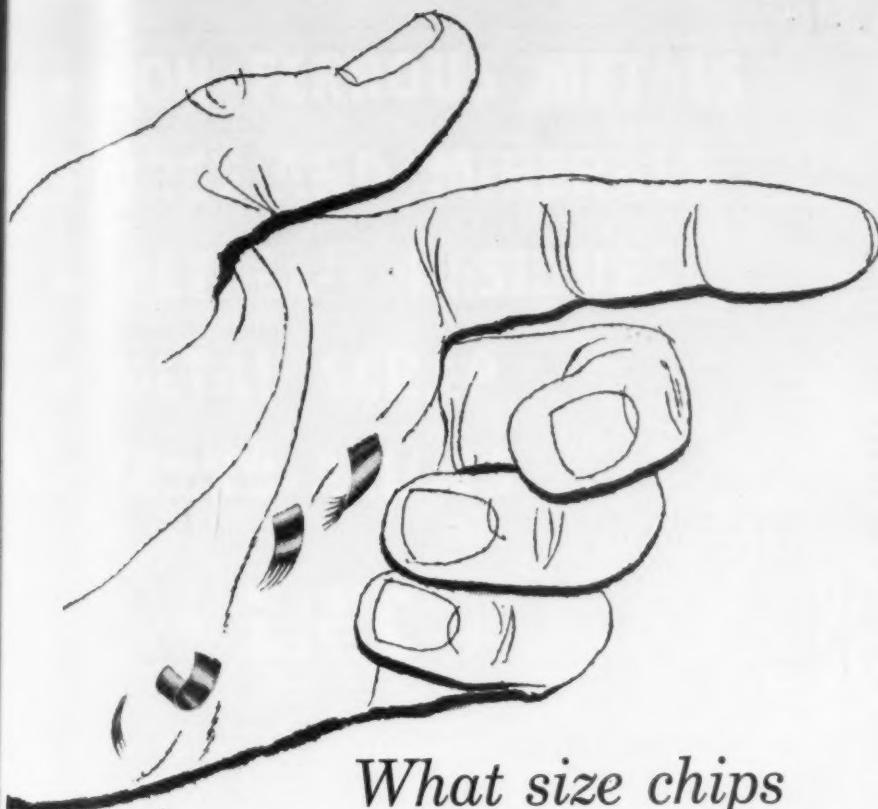
#### NONFERROUS METAL PRICES

(Cents per lb except as noted)

	May 12	May 13	May 14	May 15	May 17	May 18
Copper, electro, Conn.	30.00	30.00	30.00	30.00	30.00	30.00
Copper, Lake, delivered	30.00	30.00	30.00	30.00	30.00	30.00
Tin, Straits, New York	93.50	93.75	94.50	—	93.50	93.50*
Zinc, East St. Louis	10.25	10.25	10.25	10.25	10.25	10.25
Lead, St. Louis	13.80	13.80	13.80	13.80	13.80	13.80

Note: Quotations are going prices

\*Tentative



## What size chips should a brass rod yield?

For easier cutting and clearing, for *longer tool life*, those chips should be *short*. Chase Free-Cutting Brass Rod has just the precise amount of lead to yield these shorter chips. Chase rod means a lower unit cost on your products too — it's cleaner, smoother-surfaced, less expensive to buff or polish before finishing. Available in a wide variety of alloys. Call your nearest Chase Sales Office or Warehouse.

# Chase



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Brass, Copper, Bronze. Available upon request.

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Atlanta	Cincinnati	Detroit	Los Angeles	New Orleans	Providence	Seattle
Baltimore	Cleveland	Houston	Milwaukee	New York	Rochester†	Waterbury
Boston	Dallas	Indianapolis	Minneapolis	Philadelphia	St. Louis	(Sales office only)

# Nonferrous Prices

(Effective May 18, 1954)

## MILL PRODUCTS

(Cents per lb, unless otherwise noted)

### Aluminum

(Base 30,000 lb, f.o.b. ship. pt. frt. allowed)

**Flat Sheet:** 0.125 in. and thicker, 2S, 2S, 35.9¢; 4S, 36.0¢; 52S, 32.2¢; 24S-O, 24S-OAL, 37.0¢; 75S-O, 75S-OAL, 44.7¢; 0.081-in., 2S, 3S, 36.1¢; 4S, 37.7¢; 52S, 38.5¢; 24S-O, 24S-OAL, 38.4¢; 75S-O, 75S-OAL, 46.9¢; 0.082-in., 2S, 3S, 37.0¢; 4S, 41.8¢; 24S-O, 24S-OAL, 46.9¢; 75S-O, 75S-OAL, 58.4¢.

**Plate, 1/4-in. and Heavier:** 2S-F, 28-F, 32.4¢; 4S-F, 34.5¢; 52S-F, 36.2¢; 61S-O, 35.6¢; 24S-O, 24S-OAL, 36.9¢; 75S-O, 75S-OAL, 44.3¢.

**Extruded Solid Shapes:** Shape factors 1 to 5, 36.5¢ to 82.8¢; 12 to 14, 37.2¢ to 99.0¢; 24 to 26, 39.9¢ to \$1.29; 36 to 38, 47.2¢ to \$1.89.

**Rod, Rolled:** 1.064 to 4.5-in., 2S-F, 28-F, 43.8¢ to 37.2¢; cold-finished, 0.375 to 3.449-in., 2S-F, 28-F, 47.6¢ to 39.3¢.

**Screw Machine Stock:** Rounds, 11S-T3, 1/2 to 11/32-in., 69.6¢ to 47.0¢; 5/16-in., 46.6¢ to 43.8¢; 1/9-in. to 3-in., 42.7¢ to 39.9¢. Base 5000 lb.

**Drawn Wire:** Coiled 0.051 to 0.374-in., 2S, 44.1¢ to 32.4¢; 52S, 53.4¢ to 39.1¢; 17S-T4, 60.1¢ to 41.8¢; 61S-T4, 58.9¢ to 41.8¢.

**Extruded Tubing:** Rounds, 68S-T5, OD 1 1/2 to 2-in., 31.0¢ to 60.7¢; 2 to 4 in., 37.7¢ to 51.1¢; 4 to 6 in., 38.2¢ to 46.6¢; 6 to 9 in., 38.7¢ to 48.8¢.

**Roofing Sheet:** Flat, per sheet, 0.032-in., 42¢ x 60 in., \$2.828; x 96 in., \$4.548; x 120 in., \$5.680; x 144 in., \$6.816. Coiled sheet, per lb, 0.019 in. x 28 in., 30.8¢.

### Magnesium

(F.o.b. mill, freight allowed)

**Sheet & Plate:** FS1-O 1/4 in., 56¢; 3/16 in., 57¢; 1/4 in., 60¢; 0.064 in., 73¢; 0.032 in., 94¢. Specification grade higher. Base 30,000 lb.

**Extruded Round Rod:** M, diam 1/4 to 0.311 in., 77¢; 5/16 in., 60.5¢; 1/2 in., 1.749 in., 56¢; 2 1/2 in., 51.5¢. Other alloys higher. Base up to 1/4 in. diam, 10,000 lb; 5/16 to 2 in., 20,000 lb; 1/2 in. and larger, 30,000 lb.

**Extruded Solid Shapes:** Rectangles: M. In weight per ft, for perimeters less than size indicated: 0.10 to 0.11 lb, 3.5 in., 65.8¢; 0.22 to 0.25 lb, 5.9 in., 62.3¢; 0.50 to 0.59 lb, 8.6 in., 59.7¢; 1.8 to 2.59 lb, 19.5 in., 56.8¢; 4 to 6 lb, 28 in., 52¢. Other alloys higher. Base, in weight per ft of shape: Up to 1/2 in., 10,000 lb; 5/16 to 1.80 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

**Extruded Round Tubing:** M, 0.049 to 0.057 in. wall thickness: OD, 1/4 to 5/16 in., \$1.43; 5/16 to 5/8 in., \$1.29; 1/2 to 5/8 in., 96¢; 1 to 2 in., 79¢; 0.165 to 0.219 in. wall; OD, 5/8 to 1 1/2 in., 64¢; 1 to 2 in., 60¢; 3 to 4 in., 59¢. Other alloys higher. Base, OD: Up to 1 1/2 in., 10,000 lb; 1 1/2 to 3 in., 20,000 lb; over 3 in., 30,000 lb.

### Titanium

(10,000 lb base, f.o.b. mill)

Commercially pure and alloy grades; Sheets and strip, HR or CR, \$15; Plate, HR, \$12; Wire, rolled and/or drawn, \$11; Bar, HR or forged, \$6; Forgings, \$6.

### Nickel, Monel, Inconel

(Base prices, f.o.b. mill)

**"A" Nickel**      **Monel**      **Inconel**

Sheet, CR	86 1/2	67 1/2	92 1/2
Strip, CR	92 1/2	70 1/2	98 1/2
Rod, bar	82 1/2	65 1/2	88 1/2
Angles, HR	82 1/2	65 1/2	88 1/2
Plate, HR	84 1/2	66 1/2	90 1/2
seamless tube	115 1/2	100 1/2	137 1/2
Shot, blocks	60	...	...

### Copper, Brass, Bronze

(Freight included on 500 lb)

	Sheet	Rods	Shapes	Extruded
Copper	46.41	...	48.48	
Copper, h-r	48.38	44.73	...	
Copper, drawn		45.98	...	
Low brass	44.47	44.41	...	
Yellow brass	41.72	41.66	...	
Red brass	45.44	45.38	...	
Naval brass	45.76	40.07	41.33	
Leaded brass			39.11	
Com. bronze	46.95	46.89	...	
Mang. bronze	49.48	43.62	45.18	
Phos. bronze	66.58	67.08	...	
Muntz metal	43.96	39.77	41.02	
NI silver, 16 pct	55.36	...	62.63	

## PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99 + %, 10,000 lb, freight allowed	21.50
Aluminum pig	20.00
Antimony, American, Laredo, Tex.	28.50
Beryllium copper, per lb conta'd be, \$40.00	
Beryllium aluminum 5% Be, Dollars per lb contained Be	\$72.75
Bismuth, ton lots	\$2.25
Cadmium, del'd	\$1.70
Cobalt, 97-99% (per lb)	\$2.60 to \$2.67
Copper, electro, Conn. Valley	30.00
Copper, Lake, delivered	30.00
Gold, U. S. Treas., dollars per oz.	\$35.00
Iridium, dollars per troy oz.	\$165 to \$175
Lead, St. Louis	13.80
Lead, New York	14.00
Magnesium, 99.8 + %, f.o.b. Freeport, Tex., 10,000 lb, pig	27.00
Magnesium, sticks, 100 to 500 lb,	46.00 to 48.00
Mercury, dollars per 76-lb flask, f.o.b. New York	\$260
Nickel electro, f.o.b. N. Y., warehouse	63.08
Nickel oxide sinter, at Copper Creek, Ont., contained nickel	56.25
Palladium, dollars per troy oz.	\$31.00
Platinum, dollars per troy oz.	\$84 to \$87
Silver, New York, cents per oz.	55.25
Tin, New York	9.50
Titanium, sponge, grade A-1	\$4.72
Zinc, East St. Louis	10.25
Zinc, New York	10.75
Zirconium copper, 50 pot	\$6.20

## SCRAP METALS

### Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnsp.
Copper	26	25%
Yellow brass	19 1/2	18
Red brass	23	22%
Comm. bronze	23 1/2	22 1/2
Mang. bronze	18 1/2	17 1/2
Yellow brass rod ends	19 1/2	

### Custom Smelters' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	27	27 1/2
No. 2 copper wire	25 1/2	25 1/2
Light copper	24	
No. 1 composition	21 1/2	
No. 1 comp. turnings	20 1/2	

\*Refinery brass

\*Dry copper content.

### Ingot Makers' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	27	
No. 2 copper wire	25 1/2	
Light copper	24	
No. 1 composition	21 1/2	
No. 1 comp. turnings	20 1/2	
Rolled brass	17	
Brass pipe	18	
Radiators	17	

### Aluminum

Mixed old cast

Mixed new clips

Mixed turnings, dry

Pots and pans

### Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

	Copper and Brass
No. 1 heavy copper and wire	24 1/2 - 25
No. 2 heavy copper and wire	23 - 23 1/2
Light copper	21 - 21 1/2
New type shell cuttings	20 1/2
Auto radiators (unsweated)	15
No. 1 composition	18 1/2 - 19 1/2
No. 1 composition turnings	18 1/2 - 18 1/4
Unlined red car boxes	16
Cocks and faucets	16 - 16 1/2
Mixed heavy yellow brass	18
Old rolled brass	15 1/2
Brass pipe	16 1/2 - 17
New soft brass clippings	17 1/2 - 18
Brass rod ends	15 - 16
No. 1 brass rod turnings	14 - 15

### Aluminum

Alum. pistons and struts

Aluminum crankcases

2S aluminum clippings

Old sheet and utensils

Borings and turnings

Misc. cast aluminum

Dural clips (24S)

### Zinc

New zinc clippings

Old zinc

Zinc routings

Old die cast scrap

### Nickel and Monel

Pure nickel clippings

Clean nickel turnings

Nickel anodes

Nickel rod ends

New Monel clippings

Clean Monel turnings

Old sheet Monel

Nickel silver clippings, mixed

Nickel silver turnings, mixed

### Magnesium

Segregated solids

Castings

Miscellaneous

Block tin

No. 1 pewter

No. 1 auto babbitt

Mixed common babbitt

Solder joints

Siphon tops

Small foundry type

Monotype

Lino. and stereotype

Electrotype

Hand picked type shells

Lino. and stereo. dross

Electro dross

- NON-FERROUS METALS
- ORES AND MINERALS
- METALLIC RESIDUES
- METAL SCRAP
- FERRO ALLOYS
- ZINC

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## Trade Cautious Despite Price Hikes

**Small size of mill orders plus strict inspection tempers dealer, broker optimism . . . Many feel prices are levelling off . . . Chicago sale boosts Composite Price to \$28.08.**

Despite further price increases in several areas, the scrap trade wasn't turning any handsprings over market conditions and prospects. Many dealers and brokers believed that prices were levelling off, and some feared a summer dip might force cutbacks.

Chicago, as befits the nation's leading steelmaking district, showed greatest scrap market strength, with No. 1 heavy melting rising \$1.50. The same grade rose by that amount in Buffalo when a top mill placed a moderate order. In Pittsburgh only blast furnace material rose, but steelmaking grade prices seemed attractive to yard operators, who were reported trimming their stocks.

Other areas reported prices holding, but generally had no significant price adjustments. In Detroit, for example, out-of-area water shipments were credited with maintaining earlier prices.

Sparked by activity in Chicago, THE IRON AGE Scrap Composite Price rose another 50¢ to \$28.08.

**Pittsburgh**—Prices are tending to level off although one mill reportedly paid a higher price for choice No. 1 material. Brokers report material is more available than orders, indicating that prevailing prices have persuaded dealers the time has come to trim yard stocks. Additional freight and quality were factors in a recent purchase by an independent consumer at \$32. Blast furnace scrap is up \$1 per ton on basis of broker offerings and a sale.

**Chicago**—In a confused market with increasing consumer price resistance, Chicago scrap prices continued to edge up. Railroad, though few mill sales were reported, continued to move up on the broker buying market and argued for a further price increase in this grade. Railroad specialties were lagging. Bolstered

by mill buying, blast furnace and steelmaking grades edged up. Despite no widespread buying by consumers, electric furnace prices were holding well. There was some frank pessimism, with dealer prices failing to reflect consumer price advances in one or two grades, but the general feeling is that the market must either hold or advance, not fall. Mill inspection is reported extremely stiff, with many rejections in the past week.

**Philadelphia**—Steelmaking scrap prices continue to hold firm in this district, but some of the bullishness of dealers is reported turning in the other direction. This feeling of softness is also noted in cast grades, with heavy breakable off 50¢ a ton and considerable doubt expressed that there will be much more buying of cupola cast at the high side of the range

**New York**—The market was very quiet in this area, with prices relatively unchanged. Some out-of-area steelmaking grade sales were reported, but cast continued the best seller. Meanwhile, inquiries from foreign buyers have stimulated broker-dealer trading. Brokers are almost swamped with No. 2 grades, are trying to acquire more No. 1 material to sweeten the mix they hope to export. But few if any East Coast export deals have yet reached the actual ship-loading stage.

**Detroit**—Heavy movement of scrap out of Detroit on Lakes boats appears to be the major factor in bolstering the market at its present level. The lower water rates have also resulted in some price confusion in that the differential between Detroit and consuming areas isn't necessarily equal to the railroad freight rate. Recent price changes have brought Detroit in line with other markets and little revision is likely until the end of the month and closing of industrial lists.

**Cleveland**—Openhearth prices increased from \$1 to \$2 in this area on the basis of local consumer buying.

Despite the increase dealers and brokers are not bullish. Bellwether in this district is still electric furnace consumption, and it has shown little improvement. Turnings market remains strong. Next buy is expected to send blast furnace grades up again.

**Birmingham**—With inventories melting away and little coming into dealers' yards, the cast scrap market here is becoming extremely tight. Last week's price increases failed to bring out enough to care for all orders. Some foundries in the surrounding area were reported paying a premium for whatever scrap is available east of here. The biggest buyer of steel scrap in the district is still out of the market.

**St. Louis**—Scrap market continues in doldrums as steel mills are buying sparingly. No. 1 RR heavy melting is up \$1 per ton, as the result of mill buying. Increased demand is reported for rerolling rails which are in short supply, because of light replacement programs by the railroads.

**Cincinnati**—Market activity here is at a low ebb. Dealers and brokers don't expect to see any new buying for the remainder of the month. Heavy breakable and cupola went up \$1 to \$37 and \$39 respectively. Cast increases were due principally to sustained foundry demand and general scarcity of unprepared material.

**Buffalo**—Prices on some steelmaking grades jumped \$1.50 a ton as a top mill broke the stalemate here with a moderate order. Blast furnace items were not included in the deal. Dealers also expressed disappointment over the size of the new order.

**Boston**—Prices held firm this week with steelmaking grades edging up slightly. In cast, heavy breakable slid \$1 because of over-healthy stocks, while stove plate moved up \$1. A little trading is being done, mostly for out of district consumers.

**West Coast**—Cupola cast continued to be most active scrap item with \$1 raise in price in Los Angeles in sympathy with San Francisco price. Japanese export market believed about petered out with Japanese now offering to barter ferromanganese for steel scrap.

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## Secrets of Success

IN. 5 OF A SERIES

In 1914 Mr. Harlow H. Curtice first became associated with the automobile industry as a bookkeeper for the AC Spark Plug Company. In fifteen years, he was AC's president.

In 1933, Mr. Curtice was named president of Buick which, at that time, was in great difficulty. In five years, Mr. Curtice raised Buick to fourth place in national automobile sales, outranked only by the three low-priced makes. Buick production soared from 40,621 units in 1933 to 377,428 units in the last car-making year before Pearl Harbor.

Today Mr. Curtice is president of General Motors Corporation. The secret of his success? This excerpt, from a commencement address by Mr. Curtice, gives the surest clue:

"Think ahead of your job. Then nothing in the world can keep the job ahead from reaching out for you. Be bold, knowing that finally no one can cheat you but yourself."

## Secrets of Good Scrap Service

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kokomo, indiana • warren, ohio

## Scrap Prices

(Effective May 18, 1954)

### Pittsburgh

No. 1 hvy. melting	\$30.00 to \$31.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 bundles	30.00 to 31.00
No. 2 bundles	26.00 to 27.00
Machine shop turn.	15.00 to 16.00
Mixed, bor. and ms. turns.	15.00 to 16.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	19.00 to 20.00
Low phos. punch'gs. plate	33.00 to 34.00
Heavy turnings	28.00 to 29.00
No. 1 RR. hvy. melting	32.00 to 33.00
Scrap rails, random lgth.	37.00 to 38.00
Rails 2 ft and under	43.00 to 44.00
RR. steel wheels	35.00 to 36.00
RR. spring steel	35.00 to 36.00
RR. couplers and knuckles	35.00 to 36.00
No. 1 machinery cast	43.00 to 44.00
Cupola cast	37.00 to 38.00
Heavy breakable cast	31.00 to 32.00

### Chicago

No. 1 hvy. melting	\$30.00 to \$32.00
No. 2 hvy. melting	28.00 to 30.00
No. 1 factory bundles	31.00 to 33.00
No. 1 dealers' bundles	29.00 to 31.00
No. 2 dealers' bundles	22.00 to 23.00
Machine shop turn.	14.00 to 15.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Low phos. forge crops	36.00 to 38.00
Low phos. punch'gs. plate	33.00 to 35.00
Low phos. 3 ft and under	32.00 to 34.00
No. 1 RR. hvy. melting	32.00 to 33.00
Scrap rails, random lgth.	35.00 to 37.00
Rerolling rails	40.00 to 42.00
Rails 2 ft and under	43.00 to 44.50
Locomotive tires, cut	34.00 to 35.00
Cut bolsters & side frames	36.00 to 37.00
Angles and splice bars	37.00 to 38.00
RR. steel car axles	39.00 to 40.00
RR. couplers and knuckles	34.00 to 35.00
No. 1 machinery cast	40.00 to 42.00
Cupola cast	38.00 to 39.00
Heavy breakable cast	31.00 to 32.00
Cast iron brake shoes	36.00 to 37.00
Cast iron car wheels	34.00 to 35.00
Malleable	40.00 to 42.00
Stove plate	31.00 to 33.00

### Philadelphia Area

No. 1 hvy. melting	\$22.00 to \$23.50
No. 2 hvy. melting	20.00 to 21.50
No. 1 bundles	23.00 to 24.50
No. 2 bundles	18.00 to 19.00
Machine shop turn.	12.00 to 13.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	16.00 to 17.00
Clean cast chem. borings	24.00 to 25.00
Low phos. 5 ft and under	27.00 to 28.00
Low phos. 2 ft and under	28.00 to 29.00
Low phos. punch'gs.	28.00 to 29.00
Elec. furnace bundles	24.00 to 25.00
Heavy turnings	21.00 to 22.00
RR. steel wheels	31.00 to 32.00
RR. spring steel	31.00 to 32.00
Rails 18 in. and under	41.00 to 42.00
Cupola cast	34.00 to 37.00
Heavy breakable cast	35.00 to 36.00
Cast iron carwheels	38.00 to 39.00
Malleable	38.00 to 39.00
Unstripped motor blocks	27.00 to 28.00
No. 1 machinery cast	39.00 to 40.00
Charging box cast	36.00 to 37.00

### Cleveland

No. 1 hvy. melting	\$28.00 to \$29.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 bundles	28.00 to 29.00
No. 2 bundles	23.00 to 24.00
No. 1 busheling	28.00 to 29.00
Machine shop turn.	12.00 to 13.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Cut struct'r'l & plate, 2 ft & under	33.50 to 34.50
Drop forge flashings	28.00 to 29.00
Low phos. 2 ft & under	29.00 to 30.00
No. 1 RR. heavy melting	29.00 to 30.00
Rails 3 ft and under	44.00 to 45.00
Rails 18 in. and under	45.00 to 46.00
Railroad grade bars	27.00 to 28.00
Steel axle turnings	19.00 to 20.00
Railroad cast	41.00 to 42.00
No. 1 machinery cast	42.00 to 43.00
Stove plate	34.00 to 35.00
Malleable	40.00 to 41.00

## Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

### Youngstown

No. 1 hvy. melting	\$29.00 to \$30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 bundles	29.00 to 30.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	19.00 to 20.00
Low phos. plate	31.00 to 32.00

### Buffalo

No. 1 hvy. melting	\$25.00 to \$26.00
No. 2 hvy. melting	21.00 to 22.00
No. 1 busheling	25.00 to 26.00
No. 1 bundles	25.00 to 26.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	14.00 to 14.50
Mixed bor. and turn.	16.50 to 17.00
Shoveling turnings	17.50 to 18.00
Cast iron borings	16.50 to 17.00
Low phos. plate	27.00 to 28.00
Scrap rails, random lgth.	33.00 to 34.00
Rails 2 ft and under	40.00 to 41.00
RR. steel wheels	34.00 to 35.00
RR. spring steel	34.00 to 35.00
RR. couplers and knuckles	34.00 to 35.00
No. 1 machinery cast	40.00 to 41.00
No. 1 cupola cast	37.00 to 38.00

### Detroit

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$21.00 to \$22.00
No. 2 hvy. melting	19.00 to 20.00
No. 1 bundles, openhearth	23.00 to 24.00
No. 2 bundles	19.00 to 20.00
New busheling	21.00 to 22.00
Drop forge flashings	21.00 to 22.00
Machine shop turn.	9.00 to 10.00
Mixed bor. and turn.	11.00 to 12.00
Shoveling turnings	11.00 to 12.00
Cast iron borings	11.00 to 12.00
Low phos. punch's. plate	22.00 to 23.00
No. 1 cupola cast	36.00
Heavy breakable cast	26.00
Stove plate	30.00
Automotive cast	40.00

### St. Louis

No. 1 hvy. melting	\$25.00 to \$26.00
No. 2 hvy. melting	23.50 to 24.50
No. 1 bundles	25.00 to 26.00
No. 2 bundles	19.50 to 20.50
Machine shop turn.	12.00 to 13.00
Cast iron borings	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
No. 1 RR. hvy. melting	30.00 to 31.00
Rails, random lengths	37.00 to 38.00
Rails, 18 in. and under	40.00 to 41.00
Locomotive tires, uncut	29.00 to 30.00
Angles and splice bars	31.00 to 32.00
Std. steel car axles	35.00 to 36.00
RR. spring steel	32.50 to 33.50
Cupola cast	42.00 to 43.00
Hvy. breakable cast	27.00 to 28.00
Cast iron brake shoes	32.00 to 33.00
Stove plate	37.00 to 38.00
Cast iron car wheels	30.00 to 31.00
Malleable	34.00 to 35.00
Unstripped motors blocks	27.00 to 28.00

### New York

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$17.00 to \$18.00
No. 2 hvy. melting	15.00 to 16.00
No. 2 bundles	14.00 to 15.00
Machine shop turn.	5.00 to 6.00
Mixed bor. and turn.	7.00 to 8.00
Shoveling turnings	8.00 to 9.00
Clean cast chem. borings	18.00 to 19.00
No. 1 machinery cast	35.00 to 36.00
Mixed yard cast	29.00 to 30.00
Charging box cast	29.00 to 30.00
Heavy breakable cast	29.00 to 30.00
Unstripped motor blocks	22.00 to 23.00

### Birmingham

No. 1 hvy. melting	\$30.00
No. 2 hvy. melting	18.00
No. 1 bundles	20.00
No. 2 bundles	15.00 to 16.00
No. 1 busheling	10.00
Machine shop turn.	13.00
Shoveling turnings	15.00
Cast iron borings	13.00 to 14.00
Electric furnace bundles	25.00 to 26.00
Bar crops and plate	23.00 to 24.00
Structural and plate, 3 ft	28.00 to 29.00
No. 1 RR. hvy. melting	26.00 to 27.00
Scrap rails, random lgth.	34.00 to 35.00
Rails, 18 in. and under	37.50 to 38.50
Angles & splice bars	36.00 to 37.00
Rerolling rails	34.00 to 35.00
No. 1 cupola cast	42.00 to 43.00
Stove plate	39.00 to 40.00
Cast iron car wheels	33.00 to 34.00
Charging box cast	19.00 to 20.00
Heavy breakable	24.00 to 25.00
Unstripped motor blocks	31.00 to 32.00
Mashed tin cans	14.00 to 15.00

### Boston

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$16.50 to \$17.00
No. 2 hvy. melting	15.00 to 15.50
No. 1 bundles	16.50 to 17.00
No. 2 bundles	13.00 to 13.50
No. 1 busheling	16.50 to 17.00
Elec. furnace, 3 ft & under	17.00
Machine shop turn.	3.00 to 4.00
Mixed bor. and short turn.	5.00 to 6.00
Shoveling turnings	7.00 to 7.50
Clean cast chem. borings	13.00 to 14.00
No. 1 machinery cast	27.00 to 29.00
Mixed cupola cast	26.00 to 27.00
Heavy breakable cast	24.50 to 25.00
Stove plate	24.00 to 25.00
Unstripped motor blocks	7.00 to 8.00

### Cincinnati

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$25.00 to \$26.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 bundles	25.00 to 26.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	13.50 to 14.50
Shoveling turnings	13.50 to 14.50
Cast iron borings	13.50 to 14.50
Low phos., 18 in. & under	33.00 to 34.00
Rails, random lengths	37.00 to 38.00
Rails, 18 in. and under	44.00 to 45.00
No. 1 cupola cast	38.00 to 39.00
Hvy. breakable cast	36.00 to 37.00
Drop broken cast	45.00 to 46.00

### San Francisco

No. 1 hvy. melting	\$20.00
No. 2 hvy. melting	16.00
No. 1 bundles	19.00
No. 2 bundles	16.00
No. 3 bundles	12.00
Machine shop turn.	5.00
Cast iron borings	9.00
No. 1 RR. hvy. melting	23.00
No. 1 cupola cast	\$39.00 to 42.50

### Los Angeles

No. 1 hvy. melting	\$20.00
No. 2 hvy. melting	16.00
No. 1 bundles	17.00
No. 2 bundles	14.00
No. 3 bundles	12.00
Machine shop turn.	5.00
Shoveling turnings	7.00 to 9.00
Cast iron borings	7.00 to 9.00
Elec. fur. 1 ft and under	25.00
No. 1 RR. hvy. melting	20.00
No. 1 cupola cast	\$39.00 to 41.00

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A  
SYMBOL  
OF  
LEADERSHIP  
IN  
IRON & STEEL  
SCRAP  
SINCE  
1889



# Luria Brothers and Company, Inc.

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Philadelphia 7, Penna.

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MODENA, PENNA. PITTSBURGH, PENNA.  
ERIE, PENNA.

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EXPORTS - IMPORTS — LIVINGSTON & SOUTHDARD, INC., 99 Park Avenue, New York, N. Y. Cable Address: FORENTRACO

# Comparison of Prices

*(Effective May 18, 1954)*

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	May 18 1954	May 11 1954	Apr. 20 1954	May 19 1954
<b>Flat-Rolled Steel: (per pound)</b>				
Hot-rolled sheets	3.925¢	3.925¢	3.925¢	3.775¢
Cold-rolled sheets	4.775	4.775	4.775	4.575
Galvanized sheets (10 ga.)	5.275	5.275	5.275	5.075
Hot-rolled strip	3.925	3.925	3.925	3.725
Cold-rolled strip	5.513	5.513	5.513	5.20
Plate	4.10	4.10	4.10	3.90
Plates wrought iron	9.30	9.30	9.30	9.00
Stain's C-R strip (No. 302)	41.50	41.50	41.50	39.75
<b>Tin and Terneplate: (per base box)</b>				
Tinplate (1.50 lb.) cokes	\$8.95	\$8.95	\$8.95	\$8.95
Tinplate, electro (0.50 lb.)	7.65	7.65	7.65	7.65
Special coated mfg. terms	7.75	7.75	7.75	7.75
<b>Bars and Shapes: (per pound)</b>				
Merchant bars	4.16¢	4.16¢	4.16¢	3.95¢
Cold finished bars	5.20	5.20	5.20	4.925
Alloy bars	4.875	4.875	4.875	4.675
Structural shapes	4.10	4.10	4.10	3.85
Stainless bars (No. 302)	35.50	35.50	35.50	34.00
Wrought iron bars	10.40	10.40	10.40	10.05
<b>Wire: (per pound)</b>				
Bright wire	5.525¢	5.525¢	5.525¢	5.225¢
<b>Rails: (per 100 lb.)</b>				
Heavy rails	\$4.325	\$4.325	\$4.325	\$4.075
Light rails	5.20	5.20	5.20	5.00
<b>Semifinished Steel: (per net ton)</b>				
Rerolling billets	\$62.00	\$62.00	\$62.00	\$59.00
Slabs, rerolling	62.00	62.00	62.00	59.00
Forging billets	75.50	75.50	75.50	70.50
Alloy blooms, billets, slab	82.00	82.00	82.00	76.00
<b>Wire Rod and Skelp: (per pound)</b>				
Wire rods	4.525¢	4.525¢	4.525¢	4.325¢
Skelp	3.75	3.75	3.75	3.55
<b>Finished Steel Composite: (per pound)</b>				
Base price	4.634¢	4.634¢	4.634¢	4.390¢

## Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

## PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

← To identify producers, see Key on p. 209 →

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem B3	58.00	58.50	59.00	59.50	
Birmingham R3	52.38	52.88			
Birmingham W9	52.33	52.88			
Birmingham S5	52.38	52.88			
Buffalo R3	56.00	56.50	57.00		
Buffalo H1	56.00	56.50	57.00		
Buffalo W6	56.00	56.50	57.00		
Chicago 14	56.00	56.50	56.50	57.00	
Cleveland 45	56.00	56.50	56.50	57.00	61.00
Cleveland R3	56.00	56.50	56.50		
Daingerfield L3	52.50	52.50	52.50		
Duluth 14	56.00	56.50	56.50	57.00	
Erie 14	56.00	56.50	56.50	57.00	
Everett M6	61.25	61.75			
Fontana K1	62.00	62.50			
Geneva, Utah C7	56.00	56.50			
Granite City G2	57.90	58.40	58.90		
Hubbard Y1					
Minnequa C6	58.00	59.00	59.00		
Monessen P6	56.00				
Neville Isl. P6	56.00	56.50	56.50		
Pittsburgh U1	56.00				
Sharpville S3	56.00	56.50	56.50	57.00	
Steeltown B3	58.00	58.50	59.00	59.50	64.00
Swedenland A2	58.00	58.50	59.00	59.50	
Toledo 14	56.00	56.50	56.50	57.00	
Troy, N. Y. R1	58.00	58.50	59.00	59.50	64.00
Youngstown V1					
N. Tonawanda T1	56.50	57.00			

**DIFFERENTIALS:** Add 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct), 50¢ per ton for each 0.50 pct manganese over 1 pct., \$2 per ton for .05 to 0.75 pct nickel, \$1 for each additional 0.25 pct nickel. Subtract 38¢ per ton for phosphorus, content 0.70 and over.

**Silvery Iron:** Buffalo, H1, \$68.25; Jackson, J1, G1, \$67.00. Add \$1.50 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add \$1 per ton for 0.75 pct. or more phosphorus. Add 75¢ for each 0.50 pct manganese over 1.0 pct. Bessemer ferrosilicon prices are \$1 over comparable silvery iron.

## Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

## STAINLESS STEEL

Base price cents per lb., f.o.b. mill

Product	301	302	303	304	316	321	347	410	416	418
Ingot, rerolling	16.25	17.25	18.75	18.25	28.00	22.75	24.50	14.00		14.25
Slabs, billets, rerolling	20.50	22.75	24.75	23.75	36.25	29.50	32.25	18.25		18.50
Forg. discs, die blocks, rings	38.50	38.50	41.50	40.50	60.00	45.50	50.75	31.00	31.75	31.75
Billets, forging	29.50	29.75	32.25	31.00	46.50	35.25	39.50	24.00	24.50	24.50
Bars, wires, structural	35.25	35.50	38.25	37.25	55.50	42.00	46.75	28.75	29.25	29.25
Plates	37.25	37.50	39.75	39.75	58.75	45.75	51.25	30.00	30.50	30.50
Sheets	38.25	41.50	48.75	43.75	62.75	50.50	59.25	34.25	41.25	34.75
Strip, hot-rolled	29.75	32.00	36.75	34.25	53.25	41.00	46.50	26.25		27.00
Strip, cold-rolled	38.25	41.50	45.50	43.75	62.75	50.50	59.25	34.25	41.25	34.75

## STAINLESS STEEL PRODUCING POINTS:

**Sheets:** Midland, Pa., C11; Brackenridge, Pa., A3; Butler, Pa., A7; McKeesport, Pa., U1; Washington, Pa., W1, J1; Baltimore, E1; Middletown, O., A7; Massillon, O., R3; Gary, U1; Bridgeville, Pa., U2; New Castle, Ind., J2; Ft. Wayne, J4.

**Strip:** Midland, Pa., C11; Cleveland, A5; Carnegie, Pa., S9; McKeesport, Pa., F1; Reading, Pa., C2; Washington, Pa., W2, J2; W. Leechburg, Pa., A3; Bridgeville, Pa., U2; Detroit, M2; Canton-Massillon, O., R3; Middletown, O., A7; Harrison, N. J., D3; Youngstown, C5; Sharon, Pa., S1; Butler, Pa., A7; Wallingford, Conn., U3 (25¢ per lb higher) W1 (25¢ per lb higher); New Bedford, Mass., R6.

**Bar:** Baltimore, A7; Duquesne, Pa., U1; Munhall, Pa., U1; Reading, Pa., C2; Titusville, Pa., U2; Washington, Pa., C11; McKeesport, Pa., U1; F1; Bridgeville, Pa., U2; Dunkirk, N. Y., A3; Massillon, O., R3; Chicago, U1; Syracuse, N.Y., C11; Watervliet, N. Y., A3; Waukegan, A5; Canton, O., T5; Ft. Wayne, I4.

**Structural:** Baltimore, A7; Massillon, O., R3; Chicago, Ill., J4; Watervliet, N. Y., A3; Syracuse, C11.

**Plates:** Brackenridge, Pa., A3; Chicago, U1; Munhall, Pa., U1; Midland, Pa., C11; New Castle, Ind., J2; Middletown, A7; Washington, Pa., J2; Cleveland, Massillon, R3; Coatesville, Pa., C15.

**Forged discs, die blocks, rings:** Pittsburgh, C11; Syracuse, C11; Ferndale, Mich., A3; Washington, Pa., J2.

**Forging billets:** Midland, Pa., C11; Baltimore, A7; Washington, Pa., J2; McKeesport, F1; Massillon, Canton, O., W1; Watervliet, A3; Pittsburgh, Chicago, U1; Syracuse, C11.

# FREE-MACHINING ENDURO STAINLESS STEEL BARS



**Put parts in the pan 90% as fast as Bessemer screw stock**

You can give duplicate parts the high physical and chemical properties of stainless steel. And, you can do it without a heavy production penalty!

Simply set up and run Free-Machining ENDURO Stainless Steel Bars. They'll respond beautifully at every station on your automatics. Two grades are fully 90% as machinable as Bessemer screw stock.

These high-quality bars are cold-finished by Republic's Union Drawn

Steel Division. They provide close tolerance, accuracy of section, uniform soundness, and fine surface finish.

Free-Machining ENDURO also is available in hot-rolled bars and in wire. Republic metallurgists and machining advisers are ready to help you apply ENDURO every step of the way. Just write:

**REPUBLIC STEEL CORPORATION**  
*Alloy Steel Division • Massillon, Ohio*  
**GENERAL OFFICES • CLEVELAND 1, OHIO**  
Export Department: Chrysler Building, New York 17, N. Y.

**NEW! 96-page pocket size booklet, "How To Machine Republic ENDURO Stainless Steel Bars." Packed with machining tips, tables of feeds and speeds, stainless steel properties, other vital information. Write Republic. Ask for ADV-607. FREE!**

**REPUBLIC ENDURO**  
**FREE-MACHINING STAINLESS STEEL**



Other Republic Products include Carbon and Stainless Steels—Sheets, Strip, Bars, Wire, Pig Iron, Steel and Plastic Pipe, Bolts and Nuts, Tubing

*Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.*

IRON AGE  <b>STEEL PRICES</b> <i>(Effective May 18, 1954)</i>	BILLETS, BLOOMS, SLABS							PILING			SHAPES STRUCTURALS			STRIP					
	Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled						
EAST	Bethlehem, Pa.			\$82.00 <i>B3</i>		4.15 <i>B3</i>	6.20 <i>B3</i>	4.15 <i>B3</i>											
	Buffalo, N. Y.	\$62.00 <i>B3</i>	\$75.50 <i>R3</i> , <i>B3</i>	\$82.00 <i>R3</i> , <i>B3</i>	4.925 <i>B3</i>	4.15 <i>B3</i>	6.30 <i>B3</i>	4.15 <i>B3</i>	3.925 <i>B3</i> , <i>R3</i>	5.45 <i>B3</i>	6.00 <i>B3</i>	8.425 <i>B3</i>							
	Clayment, Del.																		
	Coatesville, Pa.																		
	Conshohocken, Pa.																		
	New Bedford, Mass.																		
	Harrison, N. J.																		
	Johnstown, Pa.	\$62.00 <i>B3</i>	\$75.50 <i>B3</i>	\$82.00 <i>B3</i>		4.15 <i>B3</i>	6.20 <i>B3</i>										12.00 <i>C1</i>		
	Fairless, Pa.																		
	New Haven, Conn.																		
	Phoenixville, Pa.					4.15 <i>P2</i>		4.15 <i>P2</i>											
	Sparrows Pt., Md.																		
	Wallingford, Conn.																		
	Worcester, Mass.																12.30 <i>A5</i> 12.45 <i>N7</i>		
MIDDLE WEST	Alton, Ill.								4.10 <i>L1</i>										
	Ashland, Ky.								3.925 <i>A7</i>										
	Canton-Massillon, Dover, Ohio			\$82.00 <i>R3</i> , <i>T5</i>													12.00 <i>G1</i>		
	Chicago, Ill.	\$62.00 <i>U1</i>	\$75.50 <i>R3</i> , <i>U1</i> , <i>W8</i>	\$82.00 <i>U1</i> , <i>W8</i> , <i>R3</i>	4.925 <i>U1</i>	4.10 <i>U1</i> , <i>W8</i>	6.175 <i>U1</i> , <i>Y1</i>	4.10 <i>U1</i>	3.925 <i>A1</i> , <i>W8</i>	5.70 <i>A1</i>	5.95 <i>R3</i>					6.40 <i>W8</i>			
	Cleveland, Ohio			\$75.50 <i>R3</i>													7.80 <i>J3</i> 8.15 <i>A5</i> 12.00 <i>A5</i> 12.15 <i>N7</i>		
	Detroit, Mich.			\$84.00 <i>R5</i>															
	Duluth, Minn.																		
	Gary, Ind. Harbor, Indiana	\$62.00 <i>U1</i>	\$75.50 <i>U1</i>	\$82.00 <i>U1</i> , <i>Y1</i>	4.925 <i>I3</i>	4.10 <i>I3</i> , <i>U1</i>	6.175 <i>U1</i> , <i>I3</i>		3.925 <i>I3</i> , <i>U1</i> , <i>Y1</i>	5.70 <i>I3</i>	5.95 <i>U1</i> , <i>I3</i> , <i>6.45 Y1</i>					6.40 <i>U1</i>			
	Granite City, Ill.																		
	Indianapolis, Ind.																		
	Mansfield, Ohio																		
	Middletown, Ohio																		
	Niles, Warren, Ohio																		
	Sharon, Pa.																		
WEST	Pittsburgh, Pa.	\$62.00 <i>U1</i> , <i>J3</i>	\$75.50 <i>J3</i> , <i>U1</i>	\$82.00 <i>U1</i> , <i>C11</i>	4.925 <i>U1</i>	4.10 <i>J3</i> , <i>U1</i>	6.175 <i>J3</i> , <i>U1</i>	4.10 <i>U1</i>	3.925 <i>A7</i> , <i>P6</i> , <i>3.95 S7</i> , <i>4.425 S9</i>	5.45 <i>B4</i> , <i>J3</i> , <i>S7</i>						7.80 <i>J3</i> 6.40 <i>S9</i> 6.45 <i>S7</i> 11.00 <i>S9</i> 12.15 <i>S7</i>			
	Midland, Pa.																		
	Butler, Pa.																		
	Portsmouth, Ohio																		
	Weirton, Wheeling, Fellowsbee, W. Va.																		
	Youngstown, Ohio																		
				\$82.00 <i>Y1</i> , <i>C10</i>		4.10 <i>Y1</i>	6.675 <i>Y1</i>												
SOUTH	Fontana, Cal.	\$70.00 <i>K1</i>	\$83.50 <i>K1</i>	\$101.00 <i>K1</i>		4.75 <i>K1</i>	6.825 <i>K1</i>	5.10 <i>K1</i>	4.70 <i>K1</i>	7.35 <i>K1</i>	7.05 <i>K1</i>					7.80 <i>K1</i> 13.45 <i>K1</i>			
	Geneva, Utah			\$75.50 <i>C7</i>		4.10 <i>C7</i>	6.175 <i>C7</i>												
	Kansas City, Mo.					4.70 <i>S2</i>	6.775 <i>S2</i>												
	Los Angeles, Torrance, Cal.			\$85.00 <i>B2</i>	\$102.00 <i>B2</i>	4.80 <i>B2</i> , <i>C7</i>	6.85 <i>B2</i>									6.55 <i>S2</i> 7.80 <i>S2</i> 7.60 <i>B2</i>			
SOUTH	Minnequa, Colo.					4.55 <i>C6</i>													
	San Francisco, Niles, Pittsburg, Cal.			\$85.00 <i>B2</i>		4.75 <i>B2</i> , <i>4.91 P9</i>	6.80 <i>B2</i>												
	Seattle, Wash.			\$89.00 <i>B2</i>		4.85 <i>B2</i>	6.90 <i>B2</i>												
	Atlanta, Ga.																		
SOUTH	Fairfield, Ala. City, Birmingham, Ala.	\$62.00 <i>T2</i>	\$75.50 <i>T2</i>			4.10 <i>R3</i> , <i>T2</i>	6.175 <i>T2</i>			3.925 <i>R3</i> , <i>T2</i> , <i>C16</i>		5.95 <i>T2</i>							
	Houston, Tex.			\$83.50 <i>S2</i>	\$90.00 <i>S2</i>	4.50 <i>S2</i>				4.325 <i>S2</i>						6.80 <i>S2</i>			

IRON AGE STEEL PRICES (Effective May 18, 1954)		Sheets									WIRE ROD	TINPLATE†		BLACK PLATE	
		Hot-rolled 18 ga. & hvyr.	Cold- rolled	Galvanized	Enamel- ing 12 ga.	Long Terne 10 ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Calv.	Hot- rolled 19 ga.		Cokes* 7.25 lb. base box	Electro* 0.25 lb. base box	Holloware Enameling 29 ga.	
	Bethlehem, Pa.														
	Buffalo, N. Y.	3.925 B3	4.775 B3				5.90 B3	7.225 B3			4.525 W6				
	Clayton, Del.														
	Coatesville, Pa.														
	Conshohocken, Pa.	3.975 A2					5.90 A2								
	Harrisburg, Pa.														
	Hartford, Conn.														
	Johnstown, Pa.														
	Fairless, Pa.	3.975 U1	4.825 U1				5.95 U1	7.275 U1					\$8.80 U1	\$7.50 U1	
	New Haven, Conn.														
	Phoenixville, Pa.														
	Sparrows Pt., Md.	3.925 B3	4.775 B3	5.275 B3			5.90 B3	7.225 B3	8.075 B3		4.625 B3	\$8.80 B3	\$7.50 B3		
	Worcester, Mass.												4.825 A5		
	Trenton, N. J.														
	Alton, Ill.												4.70 L1		
	Ashland, Ky.	3.925 A7		5.275 A7	5.175 A7										
	Canton-Massillon, Dover, Ohio			5.275 R1, R3								5.05 R1			
	Chicago, Joliet, Ill.	3.925 A1, W8					5.90 U1					4.525 A5, N4, R5			
	Starling, Ill.												4.625 N4		
	Cleveland, Ohio	3.925 J3, R3	4.775 J3, R3		5.175 R3		5.90 J3, R3	7.225 J3, R3					4.525 A5		
	Detroit, Mich.	4.075 G3, M2	4.925 G3				6.05 G3	7.375 G3							
	Newport, Ky.	3.925 N5													
	Gary, Ind. Harbor, Indiana	3.925 J3, U1, Y1	4.775 J3, U1, Y1	5.275 U1, J3	5.175 J3, U1	5.675 U1	5.90 U1, J3 6.40 Y1	7.225 U1 7.725 Y1					\$8.70 J3, U1, Y1	\$7.40 J3, U1	6.10 U1, Y1
	Granite City, Ill.	4.125 G2	4.975 G2	5.475 G2	5.375 G2									\$7.60 G2	6.30 G2
	Kokomo, Ind.	4.025 C9		5.375 C9								5.025 C9	4.625 C9		
	Mansfield, Ohio					5.675 E2						5.05 E2			
	Middletown, Ohio		4.775 A7		5.175 A7	5.675 A7									
	Niles, Ohio Sharon, Pa.	3.925 S1 5.175 N3	5.80 N3	5.275 N3	6.525 N3	5.45 S1 5.675 N3	5.90 S1							8.70 R3	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	3.925 J3, U1, P6, A7	4.775 J3, U1, P6	5.275 U1	5.175 U1		5.90 J3, U1	7.225 J3, U1	7.925 U1		4.525 A5 4.725 P6		\$8.70 J3, U1	\$7.40 J3, U1	6.10 U1
	Portsmouth, Ohio	3.925 P7	4.775 P7										4.525 P7		
	Weirton, Wheeling, Fairfax, W. Va.	3.925 W3, W5	4.775 W3, W5, F3	5.275 W3, W5		5.675 W3, W5	5.90 W3	7.225 W3					\$8.70 W3, W5	\$7.40 W3, W5	6.10 F3, W5
	Youngstown, Ohio	3.925 R3, U1, Y1	4.775 R3, Y1		5.175 Y1		5.90 U1, R3 6.40 Y1	7.225 R3 7.725 Y1				4.525 Y1		\$8.70 R3	
	Fontana, Cal.	4.70 K1	5.875 K1				6.675 K1	8.275 K1					5.325 K1		
	Geneva, Utah	4.025 C7													
	Kansas City, Mo.												4.775 C6	4.865 S2	
	Los Angeles, Torrance, Cal.	4.625 C7		6.275 C7									5.325 B2		
	Minneapolis, Colo.												4.775 C6		
	San Francisco, Niles, Pittsburg, Cal.	4.625 C7	5.725 C7	6.025 C7									5.175 C7	\$9.45 C7	\$8.15 C7
	Seattle, Wash.														
	Atlanta, Ga.														
	Fairfield, Ala. Alabama City, Ala.	3.925 R3, T2	4.775 T2	5.275 R3, T2			5.90 T2				5.125 T2 5.225 R3	4.525 T2 R3	\$8.80 T2	\$7.50 T2	
	Houston, Texas	4.325 S2											4.925 S2		

## IRON AGE

**STEEL PRICES**

(Effective May 18, 1954)

*Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.*

		BARS						PLATES			WIRE	
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Migr. Bright
EAST	Bethlehem, Pa.				4.875 B3	6.325 B3	6.225 B3					
	Buffalo, N. Y.	4.15 B3 4.18 R3	4.15 B3, R3	5.25 B5	4.875 B3, R3	6.325 B3, B5	6.225 B3	4.10 B3			6.25 B3	5.525 W6
	Claymont, Del.							4.10 C4		5.55 C4		
	Coatesville, Pa.							4.10 L4		5.55 L4		
	Conshohocken, Pa.							4.10 A2	5.15 A2		6.25 A2	
	Harrisburg, Pa.							4.10 C3	5.15 C3			
	Hartford, Conn.			5.75 R3		6.775 R3						
	Johnstown, Pa.	4.15 B3	4.15 B3		4.875 B3		6.225 B3	4.10 B3		5.55 B3	6.25 B3	5.525 B1
	Fairless, Pa.	4.30 UI	4.30 UI		5.025 UI							
	Newark, N. J.			5.85 W10		6.85 W10						
	New Haven, Conn.											
	Camden, N. J.			5.65 P10		6.50 P10						
	Poynam, Conn.			5.75 W10								
	Sparrows Pt., Md.		4.15 B3					4.10 B3		5.55 B3	6.25 B3	5.525 B1
	Palmer, Worcester, Mansfield, Mass.			5.75 B5 6.10 W11		6.775 B5						5.525 A1, W6
	Readville, Mass.			5.75 C14								
	Alton, Ill.	4.35 L1										5.70 L1
	Ashland, Ky.							4.10 A7				
	Canton-Massillon, Ohio			5.20 R2, R3	4.875 R1, T5	6.325 R2, R3, T5						
MIDDLE WEST	Chicago, Joliet, Ill.	4.15 UI, N4, W8 4.22 R3	4.15 R3, N4	5.20 A5, W10, W8, B5, L2	4.875 UI, W8, R3	6.325 A5, W8, W10, L2, R3, B5		4.10 UI, W8	5.15 UI	5.55 UI	6.25 UI	5.525 A1, R3, N4, W7
	Cleveland, Ohio	4.21 R3	4.15 R3	5.20 A5, C13		6.325 A5, C13		4.10 J3, R3	5.15 J3		6.25 J3	5.525 A1, R3, C11
	Detroit, Mich.	4.30 R5, G3		5.35 R5, P8 5.40 B5 5.45 P3	4.975 R5 5.025 G3	6.425 R5 6.475 P8 6.525 B5, P3	6.375 G3	4.25 G3			6.40 G3	
	Duluth, Minn.											5.525 A5
	Gary, Ind. Harbor, Crawfordville	4.15 J3, UI, Y1	4.15 J3, UI, Y1	5.20 R3	4.875 J3, UI, Y1	6.325 R3, M5	6.225 U1, J3 6.725 Y1	4.10 J3, UI, Y1	5.15 J3	5.55 UI	6.25 U1, J3 6.75 Y1	5.525 M4
	Granite City, Ill.							4.30 G2				
	Kokomo, Ind.											5.625 C9
	Sterling, Ill.	4.25 N4	4.25 N4									5.625 N4
	Niles, Ohio Sharon, Pa.							4.10 S1		5.55 S1	6.25 S1	
	Pittsburgh, Pa. Midland, Pa.	4.15 J3, UI	4.15 J3, UI	5.20 A5, J3, W10, R3, C8	4.875 UI, C11	6.325 A5, C11, W10, C8	6.225 J3, UI	4.10 J3, UI	5.15 UI	5.55 UI	6.25 J3, UI	5.525 A5, J3, P6
	Portsmouth, Ohio											5.525 P7
	Weirton, Wheeling, Follansbee, W. Va.	4.15 W3						4.10 W3				
	Youngstown, Ohio	4.15 UI, Y1 4.20 R3	4.15 R3, UI, Y1	5.20 Y1, F2	4.875 UI, Y1, C10	6.325 Y1, C10, F2	6.225 UI 6.725 Y1	4.10 R3, UI, Y1			6.75 Y1	5.525 V1
	Emeryville, Cal.	4.90 J5	4.90 J5									
	Fontana, Cal.	4.85 K1	4.85 K1			5.925 K1		7.475 K1	4.75 K1		6.60 K1	6.95 K1
	Geneva, Utah								4.10 C7			6.25 C7
	Kansas City, Mo.	4.75 S2	4.75 S2		5.475 S2		6.825 S2					6.125 S2
	Los Angeles, Torrance, Cal.	4.85 B2, C7	4.85 B2, C7	6.65 R3	5.925 B2		6.925 B2					6.475 B2
	Minnequa, Colo.	4.60 C6	4.75 C6						4.95 C6			5.775 C6
	Portland, Ore.	4.90 O2										6.475 C7
	San Francisco, Niles, Pittsburg, Cal.	4.85 C7, P9 4.90 B2	4.85 C7, P9 4.90 B2				6.975 B2					
	Seattle, Wash.	4.90 B2, N6	4.90 B2				6.975 B2	5.00 B2				7.15 B2
WEST	Atlanta, Ga.	4.35 A8	4.35 A8									5.725 A8
	Fairfield, Ala. City, Birmingham, Ala.	4.15 T2, C16 4.18 R3	4.15 R3, T2, C16				6.225 T2	4.10 R3, T2			6.25 T2	5.525 R1, T2
	Houston, Ft. Worth, Lone Star, Tex.	4.55 S2	4.55 S2		5.275 S2			4.50 L3, S2				5.925 S1

# Steel Prices

(Effective May 18, 1954)

## Key to Steel Producers

With Principal Offices

A1	Acme Steel Co., Chicago
A2	Alan Wood Steel Co., Cooshochuck, Pa.
A3	Allegheny Ludlum Steel Corp., Pittsburgh
A4	American Crucible Co., Carnegie, Pa.
A5	American Steel & Wire Div., Cleveland
A6	Angell Nail & Chaplet Co., Cleveland
A7	Amco Steel Corp., Middletown, O.
A8	Atlantic Steel Co., Atlanta, Ga.
B1	Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2	Bethlehem Pacific Coast Steel Corp., San Francisco
B3	Bethlehem Steel Co., Bethlehem, Pa.
B4	Blair Strip Steel Co., New Castle, Pa.
B5	Bliss & Laughlin, Inc., Harvey, Ill.
C1	Caltrup Steel Corp., Los Angeles
C2	Carpenter Steel Co., Reading, Pa.
C3	Central Iron & Steel Co., Harrisburg, Pa.
C4	Claymont Products Dept., Claymont, Del.
C5	Cold Metal Products Co., Youngstown
C6	Colorado Fuel & Iron Corp., Denver
C7	Columbia Geneva Steel Div., San Francisco
C8	Columbia Steel & Shafting Co., Pittsburgh
C9	Continental Steel Corp., Kokomo, Ind.
C10	Copperweld Steel Co., Pittsburgh, Pa.
C11	Crucible Steel Co. of America, New York
C12	Cumberland Steel Co., Cumberland, Md.
C13	Cuyahoga Steel & Wire Co., Cleveland
C14	Compressed Steel Shafting Co., Readville, Mass.
C15	G. O. Carlson, Inc., Thorndale, Pa.
C16	Connors Steel Div., Birmingham
D1	Detroit Steel Corp., Detroit
D2	Detroit Tube & Steel Div., Detroit
D3	Driver Harris Co., Harrison, N. J.
D4	Dickson Weatherproof Nail Co., Evanston, Ill.
E1	Eastern Stainless Steel Corp., Baltimore
E2	Empire Steel Co., Mansfield, O.
F1	Firth Sterling, Inc., McKeesport, Pa.
F2	Fitzsimmons Steel Corp., Youngstown
F3	Follansbee Steel Corp., Follansbee, W. Va.
G1	Globe Iron Co., Jackson, O.

G2	Granite City Steel Co., Granite City, Ill.
G3	Great Lakes Steel Corp., Detroit
G4	Greer Steel Co., Dover, O.
H1	Hanna Furnace Corp., Detroit
I2	Ingersoll Steel Div., Chicago
I3	Inland Steel Co., Chicago
I4	Interlake Iron Corp., Cleveland
J1	Jackson Iron & Steel Co., Jackson, O.
J2	Jesup Steel Corp., Washington, Pa.
J3	Jones & Laughlin Steel Corp., Pittsburgh
J4	Joslyn Mfg. & Supply Co., Chicago
J5	Judson Steel Corp., Emeryville, Calif.
K1	Kaiser Steel Corp., Fontana, Cal.
K2	Keystone Steel & Wire Co., Peoria
K3	Koppers Co., Granite City, Ill.
L1	Laclede Steel Co., St. Louis
L2	La Salle Steel Co., Chicago
L3	Lone Star Steel Co., Dallas
L4	Lukens Steel Co., Coatesville, Pa.
M1	Mahoning Valley Steel Co., Niles, O.
M2	McLouth Steel Corp., Detroit
M3	Mercer Tube & Mfg. Co., Sharon, Pa.
M4	Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5	Monarch Steel Co., Inc., Hammond, Ind.
M6	Mystic Iron Works, Everett, Mass.
N1	National Supply Co., Pittsburgh
N2	National Tube Co., Pittsburgh
N3	Niles Rolling Mill Div., Niles, O.
N4	Northwestern Steel & Wire Co., Sterling, Ill.
N5	Newport Steel Corp., Newport, Ky.
N6	Northwest Steel Rolling Mills, Seattle
N7	Newman Crosby Steel Co., Pawtucket, R. I.
O1	Oliver Iron & Steel Co., Pittsburgh
O2	Oregon Steel Mills, Portland
P1	Page Steel & Wire Div., Monessen, Pa.
P2	Phoenix Iron & Steel Co., Phoenixville, Pa.
P3	Pilgrim Drawn Steel Div., Plymouth, Mich.
P4	Pittsburgh Coke & Chemical Co., Pittsburgh
P5	Pittsburgh Screw & Bolt Co., Pittsburgh
P6	Pittsburgh Steel Co., Pittsburgh
P7	Portsmouth Div., Detroit Steel Corp., Detroit
P8	Plymouth Steel Co., Detroit
P9	Pacific States Steel Co., Niles, Cal.
P10	Precision Drawn Steel Co., Camden, N. J.
P11	Production Steel Strip Corp., Detroit
R1	Reeves Steel & Mfg. Co., Dover, O.
R2	Reliance Div., Eaton Mfg. Co., Massillon, O.
R3	Republic Steel Corp., Cleveland
R4	Roebling Sons Co., John A., Trenton, N. J.
R5	Rotary Electric Steel Co., Detroit
R6	Rodney Metals, Inc., New Bedford, Mass.
R7	Rome Strip Steel Co., Rome, N. Y.
S1	Sharon Steel Corp., Sharon, Pa.
S2	Sheffield Steel Corp., Kansas City
S3	Shenango Furnace Co., Pittsburgh
S4	Simonds Saw & Steel Co., Fitchburg, Mass.
S5	Sloss Sheffield Steel & Iron Co., Birmingham
S6	Standard Forging Corp., Chicago
S7	Stanley Works, New Britain, Conn.
S8	Superior Drawn Steel Co., Monaca, Pa.
S9	Superior Steel Corp., Carnegie, Pa.
S10	Sweet's Steel Co., Williamsport, Pa.
T1	Tonawanda Iron Div., N. Tonawanda, N. Y.
T2	Tennessee Coal & Iron Div., Fairfield
T3	Tennessee Products & Chem. Corp., Nashville
T4	Thomas Strip Div., Warren, O.
T5	Temken Steel & Tube Div., Canton, O.
T6	Tremont Nail Co., Wareham, Mass.
T7	Texas Steel Co., Fort Worth
U1	United States Steel Corp., Pittsburgh
U2	Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3	Fred Ulrich & Sons, Wallingford, Conn.
W1	Wallingford Steel Co., Wallingford, Conn.
W2	Washington Steel Corp., Washington, Pa.
W3	Weirton Steel Co., Weirton, W. Va.
W4	Wheatland Tube Co., Wheatland, Pa.
W5	Wheeling Steel Corp., Wheeling, W. Va.
W6	Wickwire Spencer Steel Div., Buffalo
W7	Wilson Steel & Wire Co., Chicago
W8	Wisconsin Steel Co., S. Chicago, Ill.
W9	Woodward Iron Co., Woodward, Ala.
W10	Wycoff Steel Co., Pittsburgh
W11	Worcester Pressed Steel Co., Worcester, Mass.
Y1	Youngstown Sheet & Tube Co., Youngstown

## PIPE AND TUBING

Base discounts (per cent) f.o.b. mills. Base price about \$200 per net ton.

STANDARD T. & C.	BUTTWELD												SEAMLESS												
	1/2 In.		3/4 In.		1 In.		1 1/4 In.		1 1/2 In.		2 In.		2 1/2 In.		2 In.		2 1/2 In.		3 In.		3 1/2-4 In.				
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	
Sparrows Pt. B3	24.25	8.0	27.25	12.0	29.75	15.5	32.25	16.5	32.75	17.5	33.25	18.0	34.75	18.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown R3	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fontana K1	13.25	+2.0	16.25	1.0	18.75	4.5	21.25	5.5	21.75	6.5	22.25	7.0	23.75	7.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh J3	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5	.....	.....	
Allen, Ill. L1	24.25	8.0	27.25	12.0	29.75	15.5	32.25	16.5	32.75	17.5	33.25	18.0	34.75	18.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sharon M3	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fairless N2	24.25	.....	27.25	.....	29.75	.....	32.25	.....	32.75	.....	33.25	.....	34.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh N1	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5	.....	.....	
Wheeling W5	26.25	20.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown Y1	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5	.....	.....	
Indiana Harbor Y1	25.25	9.0	28.25	13.0	30.75	16.5	33.25	17.5	33.75	18.5	34.25	19.0	35.75	19.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lorain N2	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5	.....	.....	
EXTRA STRONG PLAIN ENDS	27.75	13.0	31.75	17.0	33.75	20.5	34.25	19.5	34.75	20.5	35.25	21.0	35.75	20.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sparrows Pt. B3	27.75	13.0	31.75	17.0	33.75	20.5	34.25	19.5	34.75	20.5	35.25	21.0	35.75	20.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown R3	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fontana K1	16.75	20.75	22.75	23.25	23.75	24.25	24.75	25.25	25.75	26.25	26.75	27.25	27.75	28.25	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75	.....	.....	
Pittsburgh J3	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75	.....	.....	
Allen, Ill. L1	27.75	13.0	31.75	17.0	33.75	20.5	34.25	19.5	34.75	20.5	35.25	21.0	35.75	20.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sharon M3	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh N1	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75	.....	.....	
Wheeling W5	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown W4	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Indiana Harbor Y1	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75	.....	.....	
Lorain N2	29.75	15.0	33.75	18.0	34.75	21.5	35.25	20.5	35.75	21.5	36.25	22.0	36.75	21.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75	.....	.....	

Galvanized discounts based on zinc, at 11¢ per lb, East St. Louis. For each 1¢ change in zinc, discounts vary as follows: 1/2 in., 3 in., 1/2 pt.; 1 1/4 in., 2 in., 3/4 pt.; 1 1/2 in., 3 in. and under, 4 1/2 pts. higher discount. Plain ends, butt-welded and seamless, 2 1/2 pts. higher discount. Jones & Laughlin discounts apply only when zinc price changes 1¢. East St. Louis zinc price now 10.25¢.

# Steel Prices

(Effective May 18, 1954)

To identify producers, see Key on preceding page

## RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Treated
Bessemer <i>U1</i>	4.325	5.20	5.275				
So. Chicago <i>R3</i>			7.05				
Cleveland <i>R3</i>							
Ensign <i>T2</i>	4.325	5.20					
Fairfield <i>T2</i>		5.20	7.05	5.125			
Gary <i>U1</i>	4.325	5.20			5.125		
Ind. Harbor <i>I3</i>	4.325		5.275	7.05	5.125		
Johnstown <i>B3</i>		5.20					
Joliet <i>U1</i>		5.20	5.275				
Kansas City <i>S2</i>			7.30		11.00		
Lackawanna <i>B3</i>	4.325	5.20	5.275		5.125		
Lebanon <i>B3</i>			7.05	10.50	11.00		
Minnequa <i>C6</i>	4.325	5.70	5.275	7.05	5.125	11.00	
Pittsburgh <i>O1</i>				10.50		11.00	
Pittsburgh <i>P5</i>				10.50		11.00	
Pittsburgh <i>J3</i>			7.05				
Pitt., Cal. <i>C7</i>				5.275			
Seattle <i>B7</i>			7.55	5.275	11.50		
Steeltown <i>B3</i>	4.325		5.275		5.125		
Struthers <i>Y1</i>					5.275		
Terrance <i>C7</i>					5.275		
Youngstown <i>R3</i>			7.05				

## ELECTRICAL SHEETS

F.o.b. Mill Cents Per Lb	22-Gage	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length)	
			Semi- Processed	Fully Processed
Field.			8.05	
Armature.		8.15	8.40	8.90
Elect.		8.75	9.00	9.50
Motor.		9.75	10.00	10.50
Dynamo.		10.65	10.90	11.40
Trans. <i>T2</i>		11.60	11.65	12.35
Trans. <i>65</i>		12.15		
Trans. <i>58</i>		12.65	Trans. 80.....	16.25
Trans. <i>52</i>		13.65	Trans. 73.....	16.75

Producing points: Beech Bottom (*W5*); Brackenridge (*A5*); Granite City (*C7*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*N5*); Niles, O. (*N3*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville (*A7*).

\* Coils 75¢ higher.

## CLAD STEEL

Stainless-carbon No. 304, 20 pct.	Plate	Sheet
Coatesville, Pa., <i>L4</i> .....	*32.7	
Washington, Pa., <i>J2</i> .....		
Claymont, Del., <i>C4</i> .....		
New Castle, Ind., <i>I2</i> .....	32.50	
Nickel-carbon 10 pct. Coatesville, Pa., <i>L4</i> .....	37.5	
Inconel-carbon 10 pct., Coatesville, Pa., <i>L4</i> .....	46.10	
Monel-carbon 10 pct. Coatesville, Pa., <i>L4</i> .....	38.90	

\* Includes annealing and pickling, sandblasting.

## WARE-HOUSES

Cities	City Delivery Charge	Base price, f.o.b., dollars per 100 lb.													
		Sheets		Strip	Plates	Shapes	Bars		Alley Bars						
		Hot-Rolled	Cold-Rolled (15 gauge)	Galvanized (10 gauge)		Hot-Rolled	Cold-Rolled		Hot-Rolled As rolled	Cold-Finished	Hot-Rolled As rolled	Cold-Drawn As rolled	Cold-Drawn As rolled	Cold-Drawn As rolled	Cold-Finished
Baltimore	\$ 2.20	6.20	7.12	7.36- 7.78	7.00	6.85	6.98	6.86	8.17						
Birmingham	.15	6.10	7.00	8.00 <sup>4</sup>	6.30	6.35	6.35	6.15	8.90						
Boston	.20	6.89	7.83	9.18	7.13	9.35 <sup>2</sup>	7.13	7.06	8.87	8.35	12.40	11.94- 12.28	14.65	14.55- 14.58	
Buffalo	.20	6.18	7.15	8.70	6.65- 6.79	6.65	6.55- 6.59	6.35	7.70			11.95- 12.15	14.45	14.25- 14.55	
Chicago	.20	6.18	7.12	7.95	6.42	6.33	6.48	6.28	7.30			11.60		14.05	
Cincinnati	.20	6.30	7.11		6.66	6.62	6.93	6.52	7.60			11.85		14.30	
Cleveland	.20	6.18	7.12	8.25	6.58	6.50	6.79	6.34	7.40	12.04	11.74	14.29		14.19	
Denver	.795	8.85	10.45- 10.47	8.20	9.55	7.95	7.95	8.05	9.05					15.75	
Detroit	.20	8.35	7.29	8.42	6.69	7.36	6.80	6.91	6.56	7.60	12.47	11.92	14.42	13.44- 14.62	
Houston	.20	7.15	7.45	9.23	7.45	7.20	7.35	7.45	9.30			12.80			
Kansas City	.20	6.85		7.60		7.00	7.13	6.95	8.07						
Los Angeles	.20	7.25	9.00	8.85- 9.75	7.55	7.20	7.35	7.15	9.10- 9.75			12.90		15.90	
Memphis	.10	6.79	7.69		6.90	7.01	7.09	6.88	7.89- 8.76						
Milwaukee	.20	6.35	7.29	8.17	6.59	6.50	6.63	6.45	7.57			11.77		14.22	
New Orleans	.15	6.51	7.41		6.63	6.73	6.81	6.60	8.37						
New York	.30	6.78	7.75- 8.37	7.16	9.15 <sup>8</sup>	6.99	6.90	7.06	8.43	12.29	11.99	14.54		14.44	
Norfolk	.20	6.90		7.00		7.00	7.00	7.00	8.50						
Philadelphia	.25	6.35- 6.53	7.13	7.87	7.02	6.63	6.67	6.87	8.19			11.74		14.19	
Pittsburgh	.20	6.18	7.12	8.00	6.55	6.33	6.46	6.28	7.65			11.60		14.05	
Portland	.10	7.60- 8.75	8.45- 9.75	9.05	7.65	7.30	7.25	7.35	10.65						
Salt Lake City	.20	8.60	10.50	10.50 <sup>3</sup>	9.25	8.10	8.25	9.20	11.25						
San Francisco	.20	7.35	8.70	9.80	7.60	7.20	7.25	7.15	9.75			12.90		15.90	
Seattle	.20	7.95- 8.15	9.30- 9.50	9.80	7.80	7.40- 7.60	7.30- 7.50	7.40- 7.60	10.45- 10.65			13.15		15.60	
St. Louis	.20	6.48	7.42	8.25- 8.30	6.72	7.70- 7.80	6.73	6.86	6.58	7.70	12.20	11.90	14.45	14.30- 14.35	
St. Paul	.15	6.84	7.78- 8.33	8.61	7.08	13.22	6.99	7.12	6.94	8.06		12.42			

Base Quantities (Standard unless otherwise keyed): Cold finished bars; 2000 lb or over. Alloy bars; 1000 to 1999 lb. All others; 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets, for quantity.

Exceptions: <sup>(1)</sup>500 to 1499 lb. <sup>(2)</sup>20,000 lb or over. <sup>(3)</sup>450 to 1499 lb. <sup>(4)</sup>500 to 9999 lb. <sup>(5)</sup>1000 lb or over. <sup>(6)</sup>400 to 1499 lb. <sup>(7)</sup>1500 to 3499 lb. <sup>(8)</sup>2000 to 5999 lb.

## MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails		Single Loop Chain Ties Galv. Braided and Twisted Barbed Wire	March. Wires * Gals.
	Col	Col		
Alabama City <i>R3</i>	131	140	149	153
Aliquippa, Pa. <i>J3</i>	131	143	150	153
Atlanta <i>A8</i>	133	145	151	158
Bartowville <i>K2</i>	133	145	151	158
Buffalo <i>W6</i>				
Chicago, Ill. <i>N4</i>	131	143	149	156
Cleveland <i>A6</i>	137			
Crawfordsville <i>M4</i>	133	145	151	153
Donora, Pa. <i>A5</i>	131	140	149	153
Duluth <i>A5</i>	131	140	149	153
Fairfield, Ala. <i>T2</i>	131	140	149	153
Galveston <i>D4</i>	139	148		
Houston <i>S2</i>	139	148		
Johnstown, Pa. <i>B3</i>	131	143	149	156
Joliet, Ill. <i>A5</i>	131	140	149	153
Kokomo, Ind. <i>C9</i>	133	142	151	155
Los Angeles <i>B2</i>	145	152	161	165
Kansas City <i>S2</i>	145	152	161	165
Minnequa <i>C6</i>	138	148	150	162
Messens P6	131	145	151	157
Moline, Ill. <i>R3</i>			145	
Pittsburgh, Cal. <i>C7</i>	150	163	173	173
Portsmouth <i>P7</i>				6.675
Rankin, Pa. <i>A5</i>	131	140		153
So. Chicago <i>R3</i>	131	140	145	149
S. San Francisco <i>C6</i>				173
Sparrows Pt. <i>B3</i>	133		151	158
Struthers, O. <i>Y1</i>				6.675
Worcester <i>A5</i>	137			6.975
Williamsport, Pa. <i>S10</i>	133		158	

Cut Nails, carloads, base \$3.00 per kg (less 2d) is jobbers, at Conshohocken, Pa. (42).

\* Alabama City and So. Chicago don't include zinc extra.

Galvanized products computed with zinc at 11.6¢ per lb.

Size	Seamless	CARBON CONTENT	
		OD-In.	B.W.Ga.
\$ per 100 ft. carload lots, cut 10 to 24 ft.		0.26- 0.40	0.41- 0.60
F.o.b. Mill		0.61- 0.80	0.81- 1.05
		1.35	
Babcock & Wilcox.	2	13	27.34 32.98 26.51 31.95
	2½	12	36.82 44.41 35.70 43.07
	3	12	42.52 51.28 41.35 49.73
	3½	11	49.63 59.87 49.15 53.06
	4	10	65.91 79.50 63.92 77.10
National Tube.	2	13	32.98 26.51
	2½	12	36.82 44.41 35.70
	3	12	42.52 51.28 41.35
	3½	11	49.63 59.87 49.15
	4	10	65.91 79.50 63.92
Pittsburgh Steel.	2	13	27.34 32.98
	2½	12	36.82 44.41
	3	12	42.52 51.28
	3½	11	49.63 59.

## Miscellaneous Prices

(Effective May 18, 1954)

### TOOL STEEL F.o.b. Mill

	Cr	V	Mo	Co	Base per lb
18	4	1	—	5	\$1.48
18	4	1	—	5	2.16
18	4	2	—	—	1.64
18	4	2	8	—	0.95
1.5	4	1.5	8	—	1.005
6	4	2	6	—	.70
High-carbon chromium					.39
Oil hardened manganese					.35
Special carbon					.30
Extra carbon					.25
Regular carbon					.25
Warehouse prices on and east of Mississippi are 3.5¢ per lb higher. West of Mississippi, 5.5¢ higher.					

### CAST IRON WATER PIPE

Per Net Ton						
6 to 24-in., del'd Chicago	\$111.80	to \$115.30				
6 to 24-in., del'd N. Y.	115.00	to 116.00				
6 to 24-in., Birmingham	98.00	to 102.50				
6-in. and larger f.o.b. cars, San Francisco, Los Angeles, for all rail shipments; rail and water						
shipments less	\$129.50	to \$131.50				
Class "A" and gas pipe, \$5 extra; 4-in. pipe is \$5 a ton above 6-in.						

### LAKE SUPERIOR ORES

Gross Ton						
Openhearth lump						\$11.15
Old range, bessemer						10.30
Old range, nonbessemer						10.15
Mesabi, bessemer						10.05
Mesabi, nonbessemer						9.90
High phosphorus						9.90
Prices based on upper Lakes rail freight rates, Lake vessel freight rates, handling and unloading charges, and taxes thereon, in effect on June 24, 1953. Increases or decreases after such date are for buyer's account.						

### COKE

Net-Ton						
Furnace, beehive (f.o.b. oven)						\$14.25 to \$14.50
Connellsburg, Pa.						
Foundry, beehive (f.o.b. oven)						
Connellsburg, Pa.						\$16.50 to \$17.00
Foundry, oven coke						
Buffalo, del'd						\$28.08
Chicago, f.o.b.						24.50
Detroit, f.o.b.						25.50
New England, del'd						26.05
Seaboard, N. J., f.o.b.						24.00
Philadelphia, f.o.b.						23.95
Swedenland, Pa., f.o.b.						23.85
Painesville, Ohio, f.o.b.						24.00
Erie, Pa., f.o.b.						25.00
Cleveland, del'd						27.43
Cincinnati, del'd						26.56
St. Paul, f.o.b.						23.75
St. Louis, f.o.b.						26.00
Birmingham, f.o.b.						22.65
Lone Star, Tex., f.o.b.						18.50

### ELECTRODES

Cents per lb, f.o.b. plant, threaded, with nipples, unboxed

GRAPHITE			CARBON		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	20.50	40	100, 110	8.95
29	72	20.00	35	110	8.95
12 to 18	72	20.50	30	110	8.95
7 to 10	60	21.00	24	72 to 84	8.10
8	60	23.25	20	90	8.95
4	40	26.00	17	72	9.10
3	40	27.25	14	72	9.50
2 1/2	36	26.00	10, 12	60	10.30
2	24	43.50	8	60	10.55

### BOLTS, NUTS, RIVETS, SCREWS

#### Consumer Prices (Base, discount, f.o.b. mill, Pittsburgh, Cleveland, Birmingham or Chicago)

#### Nuts, Hot Pressed, Cold Punched—Sq.

	Pot Off List		
	Less Keg	Less Keg	Reg. Hvy.
1/4 in. & smaller	+2	15	+2 18
9/16 in. & 5/8 in.	+7	11	+32* +10*
5/8 in. to 1 1/2 in.			
inclusive	+8	10	+27** +6**
1 1/8 in. & larger	+9	9	+27 +6
			* 9/16 to 5/8 in.
			** 5/8 to 1 1/2 in.

#### Nuts, Hot Pressed—Hexagon

	11	26	8	23
9/16 in. & 5/8 in.	9	24	+2	15
5/8 in. to 1 1/2 in.				
inclusive	+1	16	+9	9
1 1/8 in. & larger	+16	3	+20	net

#### Nuts, Cold Punched—Hexagon

	11	26	8	23
9/16 in. & 5/8 in.	9	24	+2	15
5/8 in. to 1 1/2 in.				
inclusive	+1	16	+9	9
1 1/8 in. & larger	+16	3	+20	net
Light				
7/16 in. & smaller	33	43		
1/2 in. thru 5/8 in.	26	37		
5/8 in. to 1 1/2 in.				
inclusive	18	30		

#### Stove Bolts

	Pot Off List		
Packaged, steel, plain finished	44 1/2	—	10
Packaged, plain finish	25 1/4	—	10
Bulk, plain finish**			59*

\* Discounts apply to bulk shipments in not less than 16,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

\*\* Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

#### Rivets

	Base per 100 lb	
1/4 in. & larger		\$8.90

#### Pot Off List

7/16 in. and smaller	80
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#### Cap and Set Screws (In bulk)

	Pot Off List		
Hexagon head cap screws, coarse or fine thread, 1/4 in. thru 5/8 in. x 6 in., SAE 1020, bright	40		
5/16 in. thru 1 in. up to & including 6 in.	48		
5/8 in. thru 5/8 in. x 6 in. & shorter	43		
high C double heat treat	33		
5/8 in. thru 1 in. up to & including 6 in.	33		
Milled studs	17		
Flat head cap screws, listed sizes	13		
Fillister head cap, listed sizes	7		
Set screws, sq head, cup point, 1 in. diam. and smaller x 6 in. & shorter	37		

#### Machine and Carriage Bolts

	Pot Off List		
	Less Case	C.	
1/4 in. & smaller x 6 in. & shorter	4	20	
9/16 in. & 5/8 in. x 6 in. & shorter	5	21	
5/8 in. & larger x 6 in. & shorter	3	19	
All diam. longer than 6 in.	+4	13	
Lag, all diam. x 6 in. & shorter	12	27	
Lag, all diam. longer than 6 in.	3	23	
Plow bolts	30	..	

### REFRACTORIES

	Carloads per 1000
First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add \$5.00)	\$109.00
No. 1 Ohio	102.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	102.00
No. 2 Ohio	93.00
Ground fire clay, net ton, bulk, (except Salina, Pa., add \$1.50)	16.00

	Per net ton
Standard chemically bonded Balt.	\$86.00
Standard chemically bonded, Curtner, Calif.	96.25
Burned, Balt.	80.00
Standard Baltimore	\$109.00
Chemically bonded, Baltimore	97.50

	St. % in. grains
Domestic, f.o.b. Baltimore	
In bulk fines removed	\$64.40
Domestic, f.o.b. Chewelah, Wash., Luning, Nev.	
In bulk	38.00
In sacks	43.75

	Per net ton
F.o.b., bulk, producing points in:	
Pa., W. Va., Ohio	\$14.50
Midwest	14.60
Missouri Valley	13.65

### FLUORSPAR

Washed gravel, f.o.b. Rosiclare, Ill.	
Price, net ton; Effective CaF <sub>2</sub> content	
72 1/4%	\$44.00
70% or more	42.50
60% or less	38.00

	Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.
Swedish sponge iron, c.i.f. New York, ocean bags	11.25¢
Canadian sponge iron, del's. in East	12.0¢
Domestic sponge iron, 98+%	</td

## Ferroalloy Prices

(Effective May 18, 1954)

### Ferrochrome

Contract prices, cents per lb contained Cr, lump size, bulk, in carloads, delivered.	
65-72 Cr, 2% max. Si.	
0.025% C .. 34.50	0.20% C .. 33.50
0.06% C .. 24.50	0.50% C .. 33.25
0.10% C .. 34.00	1.00% C .. 33.00
0.15% C .. 33.75	2.00% C .. 32.75
65-69% Cr, 4.9% C ..	24.75
62-66% Cr, 4.6% C, 6-9% Si ..	35.60

### S. M. Ferrochrome

Contract price, cents per pound, chromium contained, lump size, delivered.	
High carbon type: 60.65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.	
Carloads .....	25.85
Ton lots .....	28.00
Less ton lots .....	29.50

### High-Nitrogen Ferrochrome

Low-carbon type 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 3¢ for each additional 0.25% of N.	
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### Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.	
0.10% max. C ..	\$1.18
0.50% max. C ..	1.14
9 to 11% C ..	1.11

### Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-49%, C 0.05% max.) Contract price, carloads, f.o.b. Niagara Falls, freight allowed, lump 4-in. x down, 24.75¢ per lb contained Cr plus 10.8¢ per lb contained Si. Bulk 2-in. x down, 25.05¢ per lb contained Cr plus 10.8¢ per lb contained Si. Bulk 1-in. x down, 25.25¢ per lb contained Cr plus 11.0¢ per lb contained Si.	
Contract price, carloads, f.o.b. Niagara Falls, freight allowed, lump 4-in. x down, 24.75¢ per lb contained Cr plus 10.8¢ per lb contained Si. Bulk 2-in. x down, 25.05¢ per lb contained Cr plus 10.8¢ per lb contained Si. Bulk 1-in. x down, 25.25¢ per lb contained Cr plus 11.0¢ per lb contained Si.	
Contract price, carloads .....	19.00
Ton lots .....	22.10
Less ton lots .....	23.60

### Calcium-Silicon

Contract price per lb of alloy, lump, delivered.	
30-33% Cr, 60-65% Si, 3.00 max. Fe.	
Carloads .....	19.00
Ton lots .....	22.10
Less ton lots .....	23.60

### Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered.	
16-20% Ca, 14-18% Mn, 53-59% Si.	
Carloads .....	20.00
Ton lots .....	22.30
Less ton lots .....	23.30

### 5MZ

Contract price, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe 1/2 in. x 12 mesh.	
Ton lots .....	17.50
Less ton lots .....	19.50

### V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.	
Carload lots .....	16.60
Ton lots .....	18.10
Less ton lots .....	19.35

### Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.	
Carload packed .....	17.50
Ton lots to carload packed .....	18.50
Less ton lots .....	20.00

### Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 75 pct Mn; Producing Point per-lb	
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	10.00
Clairton, Pa.	10.00
Sheridan, Pa.	10.00
Add or subtract 0.1¢ for each 1 pct Mn above or below base content.	
Briquets, delivered, 66 pct Mn: Carloads, bulk .....	12.50
Ton lots, packed .....	14.05

### Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.	
Manganese Silicon	
16 to 19% 3% max. ....	\$34.00
19 to 21% 3% max. ....	36.00
21 to 23% 3% max. ....	38.50
23 to 25% 3% max. ....	31.00

### Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.	
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.	
Carload, packed .....	36.95
Ton lots .....	38.45

### Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.	
Carloads .....	30.00
Ton lots .....	32.00
250 to 1999 lb .....	34.00
Less than 250 lb .....	37.00

Premium for hydrogen-removed metal .....

### Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn .....

Carloads Ton Less

0.07% max. C, 0.06%	
P, 90% Mn .....	30.00
0.07% max. C .....	27.95
0.15% max. C .....	27.45
0.30% max. C .....	26.95
0.50% max. C, 80-85% Si .....	26.45
Mn, 5.0-7.0% Si .....	23.45
	25.30
	26.50

### Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢.	
Carload bulk .....	11.00
Ton lots .....	12.65
Briquet contract basis carlots, bulk, delivered, per lb of briquet .....	12.65
Ton lots, packed .....	14.25

### Silvery Iron (electric furnace)

SI 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., \$92.00 gross ton, freight allowed to normal trade area. SI 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., \$89.50. Add \$1.00 per ton for each additional 0.50% Si up to and including 17%. Add \$1.45 for each 0.50% Mn over 1%.	
Ton lots .....	17.50
Less ton lots .....	19.50

### Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.	
Ton Lots Carloads	
96% Si, 2% Fe .....	20.10
97% Si, 1% Fe .....	20.60
	18.60

### Silicon Briquets

Contract price, cents per pound of briquet, bulk, delivered, 40% Si, 2 lb Si briquets.	
Carloads, bulk .....	6.30
Ton lots .....	7.90

### Electric Ferrosilicon

Contract price, cents per lb contained Si, lump, bulk, carloads, delivered.	
25% Si .....	20.00
50% Si .....	10.80
65% Si .....	12.20
	90.95% Si .....
	17.00

### Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.	
Cast Turnings Distilled	
Ton lots .....	\$2.05
	\$2.95
	\$3.75
Less ton lots .....	2.40
	3.30
	4.55

### Ferrovanadium

35-55% contract, basis, delivered, per pound, contained V.	
Openhearth .....	\$3.00-\$3.10
Crucible .....	3.10-3.20
High speed steel (Primos) .....	3.20-3.25

### Alisifer

20% Al, 40% Si, 40% Fe, contract basis f.o.b. Suspension Bridge, N. Y., per lb.

Carloads .....

Ton lots .....

Less ton lots .....

Ferro-Tantalum-Columbium, 20% Ta, 40% Cb, 30% Fe, Contract basis, delivered, ton lots, 2 in. x D, per lb of contained Cb plus Ta .....

Ferro-molybdenum, 55-75% f.o.b. Langeloeth, Pa., per pound contained Mo .....

Ferro-phosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$4.00 unitage, per gross ton .....

Ferro-titanium, 40% regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti .....

Ferro-titanium, 25% low carbon, 0.19% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti .....

Ferro-titanium, 15 to 18% high carbon, 0.21% C max., f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton .....

Ferrotungsten, 1/4 x down, packed, per pound contained W, ton lots, f.o.b. ....

Molybde oxide, briquets or cans, per lb contained Mo, f.o.b. ....

Langeloeth, Pa., bags, f.o.b. Washington, Pa., ....

Langeloeth, Pa., bags, f.o.b. ....

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound .....

Vanadium Pentoxide, 86-89% V<sub>2</sub>O<sub>5</sub>, contract basis, per pound Contained V<sub>2</sub>O<sub>5</sub> .....

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy .....

Ton lots .....

Zirconium, 12-15%, contract basis, lump, delivered, per lb of alloy .....

Carload, bulk .....

Boron Agents

Borosil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B, 3-4%, Si, 40-45%, per lb contained B .....

Bortan, f.o.b. Niagara Falls

Ton lots, per pound .....